

Carrie Rich Memorial Library
CAMPBELL UNIVERSITY

Buies Creek, North Carolina

This Volume Presented By

Mr. W. S. Horton

81-4-7

Carrie Rich Memorial Library

Campbell University

Buies Creek, NC

379

RIVERSIDE TEXTBOOKS
IN EDUCATION

EDITED BY ELLWOOD P. CUBBERLEY

DEAN OF THE SCHOOL OF EDUCATION
LELAND STANFORD JUNIOR UNIVERSITY

'MODERN METHODS IN HIGH SCHOOL TEACHING'

BY
Roy
HARL R. DOUGLASS

PROFESSOR OF EDUCATION, AND DIRECTOR OF THE UNIVERSITY
HIGH SCHOOL, UNIVERSITY OF OREGON



HOUGHTON MIFFLIN COMPANY

BOSTON NEW YORK CHICAGO SAN FRANCISCO

The Riverside Press Cambridge

Cornelia D. H. Memorial Library
Campbell College
Buies Creek, NC

COPYRIGHT, 1926

BY HARL R. DOUGLASS

ALL RIGHTS RESERVED

The Riverside Press

CAMBRIDGE • MASSACHUSETTS

PRINTED IN THE U.S.A.

TO
MY MOTHER

131528



EDITOR'S INTRODUCTION

To the student of educational history, one of the most significant of the changes which have taken place in American educational practice during the past three quarters of a century, has been the marked advance which has been made in the science and the art of classroom instruction. Beginning as we did with an individual and a memoriter form of lesson hearing, in which the work of the teacher was that of school keeping rather than teaching, by the middle of the nineteenth century we had evolved the class form of organization and instruction. The pupils now recited in groups what they had just learned from their textbooks, and the skill of the teacher came to consist in an ability to assign, question, drill, and test. This type of textbook teaching is still the usual method of the beginning teacher, as well as of older teachers who have not made proper progress in the mastery of the newer forms of teaching technique.

The introduction of the newer psychological conceptions as to the nature of the learning process, which followed the coming of Pestalozzian and Herbartian ideas to this country, for the first time called for the development of a sound "technique of instruction," and for the training of teachers in the science and art of teaching. By means of selected subject-matter, now to be logically organized and psychologically presented, teachers were to drill their pupils, train them in reasoning and judgment, develop the powers of the mind, and impart the information needed for life's purposes. To carry a class along thinking, rather than merely reciting, which the new teaching procedure required, called at once for broad knowledge of subject-matter on the part of the

teacher, thorough grounding in the psychology of the learning process, and advance lesson-planning — all of which tended to make the professional preparation of teachers very desirable. It may be said that by about 1890 the need for training teachers in psychology and teaching methods, as well as the desirability of giving them further education in subject-matter than was represented in the schools in which they were to teach, had been accepted generally, in principle at least, by the American people, and by about 1900 we find a distinct movement, on the part of most of our States, to make some professional preparation a prerequisite for certification for teaching.

Since the latter date a series of new influences and a number of new conceptions as to the educative process have come to modify our earlier ideas as to the nature and purpose of teaching. Especially during the past decade and a half have these new influences and conceptions been deeply influential in redirecting the work of the school. Instead of existing chiefly for subject-matter ends, the school has now come to be conceived of as a social institution, maintained by society to fit young people for the responsibilities of life in a complex social, scientific, and economic world. The center of gravity in all progressive school systems has in consequence been shifted from the class to the pupils in the class, and the real problem in education has come to be conceived of not so much as one of subject-matter as of the pupils who present themselves for education. The pupils, too, have been revealed by modern studies as differing widely in abilities, needs, capacities, and futures, so that the problem of instructing them has become an individual problem to a degree undreamed of a quarter of a century ago.

With the coming of these newer conceptions as to the nature and purpose of the school, teaching young people

has been shown to be far more of a scientific process than was even recently thought to be the case. Instead of mass or even class instruction, the teaching process has been revealed as individual to a large degree, and the work of the teacher has come to be understood as that of guiding and directing the normal processes of thought and action of boys and girls of widely differing capacities, interests, and destinies. The main duty of the teacher, in this new type of school, is not primarily the imparting of information or the drilling of pupils in its mastery, important even as these may be, but rather to awaken new interests, to stimulate pupils to new educational activity, to extend appreciation in new directions, to connect the work of the school with life in a better way, to widen the horizons of ambitious youths, to stimulate them to develop for themselves larger and better ideals for life service, to awaken guiding moral impulses, to train for effective self-direction, and to prepare for socialized living in our complex social and economic and political life. Social and citizenship aims have thus been added to the older knowledge aim of the school.

The effect on teaching technique of the rather general acceptance of these new conceptions as to the nature of the work of the school has been important and far-reaching. To the older psychological conception of the teaching process has been added the newer social and civic conceptions, and new forms of teaching technique have been worked out to enable the teacher better to meet these new needs in instruction. While good psychological procedures are as important as ever before, a new emphasis has been placed on the desirable outcomes of teaching as these find expression in information mastered, habits formed, skills learned, ideals awakened and fixed, and attitudes developed. The prime problem in teaching has come to be that of so stimulating the pupil to educational activity that he will

educate himself. Accordingly, problem-solving instruction, project work, supervision of the pupils' studying, socialized procedures, and individual progress have attained an importance for the teacher undreamed of two decades ago. Standard tests and achievement scores have been worked out as guides in instruction, the old written examination has been extended into new forms, and a technique of classroom experimentation has been developed, all as aids to the teacher who would keep abreast of the progress being made in the science and the art of teaching.

While the more simple technique of questioning, assignment, review procedures, and lesson-planning is that which beginning teachers should first master, this alone is no longer sufficient for one who would become a master teacher. The newer conceptions as to aims and purposes and methods in education have taken too deep hold on the school for it to be satisfied longer with teachers whose teaching repertoire consists only of these simple though fundamental forms of technique. Both the teacher in training and the teacher in service need to inform themselves as to the best that has been worked out in the field of teaching procedures, as the present tendency in school supervision is to leave behind the teacher who does not strive to advance her skill in classroom teaching by experimentation with the newer methods, with a view to becoming a master teacher. Regardless of the importance of all other measures, the ability to develop a flexible and an effective classroom technique probably always will remain the primary criterion for estimating a teacher's growth and professional progress.

The author of the present volume in this series of textbooks has here presented us with a progressive organization of the technique of teaching in high schools, and has described the best recent experimentation in the field of teaching practice. The book is intended primarily as a

textbook for classes in the principles of teaching in secondary schools, or advanced classes in the newer methods of high school teaching, as offered in our colleges and other teacher-training institutions. Beginning with a statement of the desirable outcomes of teaching and their development, the author then passes step by step from the simpler to the more difficult teaching procedures, pointing out the nature, application, usefulness, and limitations of each special form of teaching technique considered. The book as organized ought also to be of much use to those teachers in service who desire to study the best that has been worked out in the field of teaching methods, either as individual students or in summer-session classes intended primarily for experienced teachers. While the treatment is general, and does not take up methods in the different secondary school subjects, the references are sufficiently full to enable the instructor to make such assignments to any extent he may desire. In the form here presented it is hoped, by both the author and the editor, that the book may prove of large usefulness as a textbook in all teacher-training institutions.

ELLWOOD P. CUBBERLEY

AUTHOR'S PREFACE

THIS volume has been written with the conviction that there is a widely felt need on the part of teachers, supervisors, principals, and superintendents of schools, as well as by teachers of courses on methods of teaching in high schools, for a treatment, within the covers of one book, of the numerous and important recent developments in teaching practice. Such a volume should serve to introduce high school teachers in training and in service to the fundamentals of both the theory and the technique of the newly developed teaching procedures. Our better teachers no longer confine their teaching to such traditional methods as the review lesson, the inductive lesson, the deductive lesson, the appreciation lesson, the test lesson and the like, but are planning their work also to include supervised study, socialized class procedure, visual instruction, problem and project methods, classroom provisions for individual differences, and scientific classroom testing and experimentation. It has been felt that there is need to-day for a text which will cover the technique of all these newer types of teaching procedures, and will thus save the labor involved in reading a different book for each one.

The large increase in enrollments in our high schools, together with the decreased level of ability and of strength of educational purpose on the part of many of the pupils, and the increased competition of present-day life for the interests and effort of young people, have served to make necessary the use of more effective methods of teaching. The new conception of education as a process of guiding individual development also argues for an increased skill

and art in classroom teaching. The master teacher now must add a number of new strings to his bow — new methods to his professional equipment.

The author has for some time and in a number of ways been engaged in assisting high school teachers, both in service and in training, to develop a clearer understanding of the new movements in teaching practice, and has felt keenly the need for a basic volume to put into the hands of teachers. As yet there has been no one volume which has adequately treated of all or nearly all of the new procedures. While much use can be made of the wealth of periodical literature that is accumulating, this has first to be organized and summarized to make it of much use to teachers, and often then important articles are not available. This organizing and summarizing the author has here attempted, and it is in the discussion of the newer methods that he feels that he has made his main contribution.

The task of this book will be a discussion of the technique of adjusting education to the needs of adolescents, in the light of modern knowledge as to the purposes of secondary education. The new and more complex situation which we to-day face requires that teachers, in addition to possessing a more effective technique and larger skill in old methods, attain also to a mastery of a wider variety of procedures from which to choose in carrying on their teaching work. While it would have been quite helpful, had space permitted, to have preceded the discussion of teaching methods with a brief consideration of the nature of the learning process with adolescent boys and girls, and the psychological foundations of interests and motives as they relate to whole-hearted pupil activity, these are so well established in educational psychology that the instructor can easily supply them, in case he feels that the class needs such an

orientation before beginning the study of teaching methods. Instead, this book will begin with a consideration of the important outcomes of all teaching and of how best to develop these. It will then pass to a brief consideration of a number of the more common details of teaching technique with which every teacher should be familiar — the use of textbooks and references, developmental methods, lecturing or telling, drill work, questioning, assigning work, and planning the instruction.

Beginning with Chapter III, a discussion of the more modern technique, devices, and methods of teaching is taken up. As it has been the purpose to include in the two preceding chapters the essentials of technique for the apprentice teacher, in the chapters which now follow, the procedures which go to make up the professional skill of the master teacher are discussed. Among these are the supervision of pupil-study, teaching how to study, the technique of visual instruction, socialized class procedure, problem and project teaching, and the adjustment of instruction to the varying abilities of the pupils.

Toward the close of the book, in Chapters XII to XV inclusive, is given a discussion of two phases of the teacher's work which have received, in the past decade, a lion's share of investigation and study, namely, the more accurate measurement of the results of instruction, and the adjustment of instruction to individual needs.

The work of the modern master teacher also includes the investigation of, and experimentation with, new and suggested procedures. The technique of accurate determination of the worth of procedures is indeed a most recent development, and yet there is no reason why every ambitious and progressive teacher should not include it in his professional training. To give some idea as to what may be done by the teacher, and as to the use of experimental methods

in education, an outline of useful experimental procedure for the classroom investigation of teaching problems is given in the final chapter.

Because of the large amount of material already available in books on general method, constructed along the lines of the older and more standard teaching procedures, the preliminary chapters here devoted to the discussion of these are intended to be of the nature of summaries of suggestions for effective practice, with relatively little discussion of the underlying theory. In the chapters which follow, dealing with the more modern teaching procedures, the discussions are intended to be much fuller and to furnish some background and explanation of the theoretical considerations relating to each. The attempt has been made to give the spirit, as well as to state the fundamental principles and the technique, for each of the more recently developed teaching methods.

No attempt has been made in the book to commit the instructor to any given method of teaching. The book may be employed as a general text in high school teaching methods, as a reference book where problem methods are used, as collateral reading for lecture courses, or as a textbook for advanced classes in the newer methods where a socialized class discussion method of instruction is followed. The author was unwilling to assume the risk of seriously limiting the usefulness of the book by specially adapting it to any preconceived type of instruction. Rather, the intention was to keep purposely free in this respect, in the belief that every teacher is quite capable of choosing his own methods and making his own adaptations.

Following the custom of the series of textbooks in which this volume appears, questions and exercises are appended to each chapter. For the most part these are questions and exercises which the author has found helpful in stimulating

students to critical attitudes, to thinking in terms of application, to supplementation, and to comparisons. These will also be found quite worth while to readers, other than students in regular college courses, who wish to profit most fully from the material presented. The references given at the close of each chapter have been chosen on the basis of their usefulness to students in classes, taught by the author, in which these topics were studied. They have been made especially full on the different high school subjects, so as to afford reading material for students having special subject-matter interests.

The book has been written from the viewpoint that secondary education consists in assisting child nature to grow and unfold, and in guiding youth by furnishing experiences favorable to the acquisition of information, habits, skills, ideals, and attitudes which are the expression of the learner's self in the direction of the balanced individual-social aim of the school. While teaching procedures are discussed from this angle, the author makes no particular claim for originality. Indeed, the debt of the author is very heavy. He has seen fit to employ principles, concepts, and suggestions from a very wide variety of influences and sources. Among present-day writers of whose influence the author is conscious, in some connection or another, should be mentioned: Bagley, Betts, Charters, Colvin, Cubberley, Freeland, Freeman, Hall-Quest, Inglis, Kilpatrick, King, McCall, McGregor, Meriam, Miller (H. L.), Monroe (W. S.), Parker, Ruediger, Robbins, Ruch, Stetson (F. L.), Stevenson, Stormzand, Thomas (F. W.), and Thorndike.

Quite influential in demonstrating the possibilities of the new procedures, as well as in exhibiting great skill in the use of the older technique, has been the small group of progressive and capable teachers constituting the faculty of the

University High School, of the University of Oregon, since the author became director of the school in 1919. From the hundreds of cadet teachers, in whose classrooms the author has spent from six to eight hours a week for the past six years, not a little in suggestion has been gained. To both of these sources he acknowledges his indebtedness.

The author is also indebted for many suggestions, and for some modification of his views, to the students of his university classes in a course covering much of the material found in the book, and especially to those who were members of Education 203, at Stanford University, during the summer quarters of 1924 and 1925.

Thanks are due to Professors Fred L. Stetson, Homer P. Rainey, Howard R. Taylor, and Margaret B. Goodall, of the University of Oregon; Harold R. Benjamin, of Stanford University; and Rollein P. Dickerson, of the Ethical Culture School of New York, for reading portions of the manuscript and for many valuable suggestions.

Most heavily and most immediately the author is indebted to Dean Ellwood P. Cubberley, of Stanford University, the editor of this series of textbooks, and to the author's wife. The former has done much for this book in giving coherence and readability to what might else have been but a group of enthusiastic ideas. To Zanna M. Douglass, whose partnership in this as in all the author's interests has been most helpful, and who gave numerous valuable suggestions while engaged in typing the manuscript, the author gratefully acknowledges a debt beyond repaying.

HARL R. DOUGLASS

CONTENTS

I. OUTCOMES OF TEACHING, AND THEIR DEVELOPMENT	1
II. QUESTIONING, ASSIGNMENT, AND REVIEW PROCEDURE	31
III. PLANNING THE INSTRUCTION	69
IV. SUPERVISING PUPIL STUDY	101
V. TEACHING YOUNG PEOPLE HOW TO STUDY	144
VI. VISUAL INSTRUCTION	180
VII. TECHNIQUE OF USING VISUAL AIDS	205
VIII. SOCIALIZED CLASS PROCEDURE	241
IX. TECHNIQUE OF SOCIALIZED PROCEDURE	262
X. PROBLEM TEACHING	295
XI. PROJECT TEACHING	323
XII. QUIZZES, EXAMINATIONS, AND MARKING	357
XIII. THE USE OF STANDARD ACHIEVEMENT TESTS AND SCALES	392
XIV. NEW IDEAS IN WRITTEN EXAMINATIONS	427
XV. ADJUSTMENT OF INSTRUCTION TO INDIVIDUAL NEEDS	457
XVI. THE TECHNIQUE OF CONTROLLED CLASSROOM EXPERI- MENTATION	503
INDEX	531

MODERN METHODS IN HIGH SCHOOL TEACHING



CHAPTER I

OUTCOMES OF TEACHING AND THEIR DEVELOPMENT

The problem of teaching method

1. *The acquisition and imparting of information:* The two main methods employed — Relative advantages of the developmental and authoritative methods — Telling methods — Peculiar advantages of telling — Opportunities for telling — Technique of telling — Reading as a form of telling — The textbook — Textbook teaching — Suggestions on technique of textbook teaching — Collateral readings — Using collateral readings — Other methods of teaching information; developmental methods.
2. *The retention of information once imparted:* Factors operating in retention — Repetition for retention of information — Levels of mastery.
3. *The acquisition of habits and skills:* Relation to the laws of learning — Suggestions on technique of developing habits and skills.
4. *Acquiring ideals and attitudes:* Information and skills *vs.* attitudes — Concomitant incidental outcomes — Attitudes, interests, and ideals through the curriculum — Technique of the appreciation lesson.
Questions and exercises — Selected references.

The problem of teaching method

It is said that a friend of the great Whistler was once very much overwhelmed with one of the famous painter's productions, and exclaimed, "How can it be done!" Whistler replied solemnly, "It is a very simple matter, my friend. One does but select the appropriate colors and put them on in the right place in the right amount." Similarly, developing the broad principles of teaching method may

seem at first thought quite simple. After having analyzed the means by which future human responses may be stimulated and controlled — that is, after having determined through what psychological procedures education can be made to take place — there remains simply the task of working out the technique by which each of the desired outcomes of teaching may be most economically effected. Like Whistler's painting, though, this requires genius.

Philosophers and teachers from time immemorial, and in particular psychologists during the past half-century, have attacked these problems in large number and with great devotion and interest. Still, the net result of all their effort, all their observation and introspection, of all their experimentation and analysis, leaves much to be desired. While much is known with reference to the psychology and the technique of imparting and acquiring information, and of acquiring and developing habits and skills, there is a great deal yet to be done. With regard to acquiring attitudes and ideals only a beginning has as yet been made. Teachers have discovered that there are "better" methods which, when tried out in the acid test of classroom practice, yield better results. Incomplete as they are, these facts mean much for the teacher and constitute a marked advance over the stock of method and technique at the command of teachers a few decades ago.

One of the most baffling difficulties in the way of the approach to better teaching methods, by means of an analysis of the outcomes of teaching, lies in the fact that rarely is one engaged in trying to produce a single type of outcome. For example, in the acquisition of information we cannot help but acquire some skills in reading, thinking, and memorizing; some attitudes toward the subject with reference to the characters, objects, or movements to which the information pertains; and some habits, interests, and

ideals, positive or negative. There are many times in teaching when the dominant aim and the point of most concern are the imparting of information, as in teaching the structure of a living organism; the development of some interest or attitude, as the appreciation of a bit of literature or music; the development of some skill, as in typewriting.

Still more, the technique of developing these special types of outcomes may be differentiated, and again combined where two or more types of outcomes are aimed at, without change in their essential nature. We shall devote this present chapter to a consideration of how best to attain these important outcomes of the teaching process and purpose.

1. The acquisition and imparting of information

The two main methods employed. Methods of imparting as well as of acquiring information may be classified under the two main headings: the method of reference to competent authority, and the method of development from facts already known. Under the first should be placed all procedures in which the learner accepts the information upon the authority of a teacher, or the printed material, and in which the major portion of the student's efforts are centered on understanding and retaining the information. Under the second heading should be placed those procedures in which the learner's efforts are centered, to a very large degree, upon deriving, deducing, or developing information.

As is the case in many instances of such apparently simple classification, the methods to be classified do not fall, in any clear-cut fashion, under one or the other of the two main headings. Many teaching methods partake of the nature of both classifications, and as a consequence may be classified only by the process of deciding under which heading each more properly belongs.

Among the methods which may be considered as authoritative are:

1. Telling.
2. Textbooks, and reference assignments.
3. Direct sensory presentation — visual instruction, etc.

Among the developmental methods are:

1. The deductive; that is, the problem-solving method.
2. The inductive; that is, the generalizing method.
3. The Socratic-developmental method, which is a special type of the deductive method.

Relative advantages of the developmental and authoritative methods. A review and a general summary of the two types of bringing a learner into contact with information indicate the following comparative advantages and limitations of the two methods:

Superior points of the authoritative type of method.

1. Things can be told much more quickly than they can be developed.
2. A logical organization can be better preserved.
3. Authoritative methods can be more successfully employed by teachers of mediocre ability.
4. Digression is not so likely to occur.
5. Authoritative methods may be used in situations where it is impossible or highly impractical to use developmental methods.
6. In many instances the subject-matter is not of sufficient importance to warrant the increased expenditure of time, or is of itself of such interest and ease of understanding that authoritative methods will produce satisfactory results.

Superior points of the developmental type of method.

1. Increased vividness of presentation is likely to result from the activity involved in the development of a problem or idea.
2. In the developing process, associations are established which promote retention and which contribute to perspective.
3. Because of the type of procedure followed, information

developed — that is, rules derived inductively — are more completely understood.

4. If the information is forgotten, it may be reconstructed by developing it again.
5. Of as great value in most instances as the information itself are the values of such by-products of the developing method as:
 - a. The habit of thinking for one's self.
 - b. Increased skill in thinking for one's self.
 - c. Increased confidence in one's conclusions.
6. Increased interest usually accompanies the process of developing facts for one's self.
7. Developmental methods afford a better opportunity for study of the individual child and the class, their manner and methods of thinking, quality of temperaments, etc.

While the developmental types of method are not those which the beginning teacher can use with any large degree of success, the superior teacher of to-day appreciates their peculiar advantages. After having experimented with and attained some mastery in their technique, and having become conscious of their peculiar limitations, they should be added to one's repertoire of useful teaching methods, to be used at times and in cases where they are the most effective methods to use. The developmental methods may be employed with marked advantage if one uses good judgment in decisions as to occasions calling for them.

We shall first consider the use of the different authoritative methods enumerated above, and then take up the discussion of developmental methods further on in the book.

Telling methods. It is rather commonly agreed that the lecture method as such has little place in the junior or the senior high school. Perhaps statements to this effect, though, should not be taken too literally. As a matter of fact much telling can be done, to excellent advantage, by a majority of teachers. Far too much of many recitation periods is occupied with oral testing. A better procedure

would call for less testing, and more teaching. There are several reasons why the oral testing is crowding telling from the recitation, among which are:

1. Teachers and pupils attach an undue importance to printed textbooks.
2. Teachers, in many instances, are not masters of the subjects they teach, and unfortunately are not in a position to add much to the material found in the text.
3. The heavy teaching load prohibits teachers from making the preparation and doing the reading and planning necessary to make supplementary telling by the teacher possible.
4. The length of recitation does not permit of much telling, in addition to a thorough testing of each day's lesson.
5. Teachers have not developed technique in those superior methods which make daily testing, as an incentive to daily student preparation, unnecessary.
6. Unprogressive principals and superintendents do not look with favor upon "telling" teachers. They are steeped in the traditional viewpoint which looks with disfavor upon anything that smacks of "soft" pedagogy.
7. Teachers are inclined to teach as they were taught.
8. Oral testing is much easier to do than is successful telling.

One of the most prominent characteristics of mediocre teaching is the conduct of a "catechism" type of recitation. The teacher asks fact questions; accepts verbatim and poorly digested answers; works with the textbook in hand and finger on page; and conducts the lesson after a bookish manner. What a relief it is, after having witnessed a number of such amateurish performances, to step into a classroom where reasonable student preparation can be safely assumed, and where the teacher is adding to the skeleton of facts found in the textbook, from a seemingly inexhaustible source, a fund of rich and interesting detail and explanation. The dry bones of the textbook take on flesh and blood. The teacher is giving the subject life, creating instead of killing interest, and is establishing himself as the leader of the

group by virtue of superior experience, as well as by constituted authority. What a difference of attitude on the part of students one usually finds! How much better almost invariably is the attitude of student toward teacher!

Peculiar advantages of telling. In addition to the advantages of the authoritative methods already enumerated, oral telling by the teacher has certain strong points peculiar to it:

1. It permits of the introduction of material not found in the textbook.
2. The superiority of the human voice over the printed page as a medium of conveying thought contributes to effectiveness. One often travels miles and pays an admission fee to hear a speaker, whose speech may be read in full in the newspaper or in some book.
3. It permits of an inflection and emphasis which serve to give meaning and emphasis to words and ideas, in a manner impossible to the printed page.
4. Material may be better adapted to age, instincts, interests, and the vocabulary of the class, and to the organization and problems of the subject-matter being studied.
5. Often it saves time which would otherwise be spent by pupils in searching for the appropriate material.
6. It permits of judicious selection, where there is need for limiting the amount of material to be considered by the pupils.
7. There is provided opportunity for pupils to raise questions at the time they occur, and to receive enlightenment which, in the case of textbook or reference work, is not possible, except where the work is being carried on in a supervised-study period. (Chapter VIII.)
8. It furnishes an opportunity for pupils to "hear" correct English, and to experience a model for their own "telling," in or out of the schoolroom.

It is worthy of consideration that in the German elementary schools, of whose effectiveness so much has been said, telling is used almost entirely as the method of instruction.

Opportunities for telling. While much can be said in favor of more oral telling by the teacher, the inference should not be made that by such the lecture method, as employed in colleges and universities, is recommended for the high school. The immaturity of high school pupils is such that they cannot be expected to possess the power of sustained attention to speech, for a period of forty-five minutes, unless the material be of much more interest than most teachers can hope to infuse into high school subjects. It is true, too, that high school pupils do not possess the ability to condense lectured material and analyze it into serviceable notes for future reference. Yet there will be occasions where "lectures" for an entire forty-five-minute period may be desirable, and perhaps many more times when telling occupying half of that amount of time may be advantageously employed. There are also daily opportunities for short "tellings" of a few minutes in length. If the material is well prepared and delivered, these may add very materially to the effectiveness of the instruction.

Some of the occasions where telling may be used to advantage are:

1. Introductory remarks in approaching a new topic, which may have as their purpose:
 - a. To show how the new topic fits into the work.
 - b. To give a bird's-eye view of the work to come.
 - c. To arouse interest in new work.
 - d. To give adequate explanations for the students to begin the new work.

This type of telling is important in assigning new work.

2. Summaries: (a) at the close of a day's work; (b) at the close of a topic in the day's work; (c) at the conclusion of a chapter or other large unit of work; (d) at the beginning of the hour as a means of review for mind-set and content.
3. On occasions where problems arise or questions are asked by members of the class which are sincere, and reasonably valuable and pertinent. The danger of digression is often

magnified by teachers who have a blind faith in the peculiar merit of logical organization, and a corresponding lack of appreciation of the value of "striking while the iron is hot."

4. Where supplementary material may be introduced to advantage, such as:
 - a. Recent material.
 - b. Interesting detail, historical backgrounds, biography, illustration, applications, etc.
 - c. Explanation of the author's viewpoints, and exposition of teacher's.
 - d. Material not convenient to students because of limited library facilities.
5. Explanations of visual material, such as slides, pictures, graphs, films, and specimens.
6. Short talks to arouse interest and appreciation, or to stir up emotional reactions, as in literature, history and social science, and music.
7. Where, by reason of poor preparation or difficult subject-matter a reasonable amount of questioning does not seem to further the development of the work of the hour.

Technique of telling. One of the reasons given for the under-development of telling in the high school, and its low effectiveness in college, is the difficulty with which effective lecturing skill is acquired. Certain suggestions may be made which, if followed, will add much to the efficiency of telling by the teacher.

1. Where talks are to consume more than a few minutes, they should be outlined and clearly thought through. Impromptu talks, like impromptu teaching, are apt to be loosely organized and ineffective.
2. Illustrations should be provided, if practical, in the way of charts and diagrams.
3. Begin if possible by arousing in the minds of the class a problem, a question upon which you propose to throw light.
4. As much as possible, keep the class in a problematic and expectant attitude. Point out problems and questions along the way.
5. Be careful as to pace. Speakers generally talk too rapidly.

Allow time for thought — for mental supplementation. Adjust pace to difficulties of the material presented and to the ability of the class to take notes, if notes should be taken.

6. Occasionally check up on your audience to see that they are following you. Be careful not to fall into the fallacy of assuming that what you say is as clear to your hearers as it is to you.
7. Use interested, earnest conversational tones and a personal conversational manner. Look into the faces of your hearers. Talk to your pupils; do not lecture to your class.
8. Pause occasionally for reactions. Break up the long stretches. Occasionally intersperse discussion.
9. On occasions it is wise to furnish the class with an outline of your talk in advance. This may be in the form of hektographed copies, or written on the blackboard. Outlines of this sort serve as a constant summary, and relieve the class of what may be a distraction — the note-taking. A very good device to use when you are thoroughly familiar with what you expect to say, is to outline your talk on the board as you proceed.
10. Exhibit a sense of humor in some other way than using funny stories as illustrations. Phrase your remarks where possible in an attractive way. Do not be self-conscious and sensitive while you are talking. Beginning teachers are far too much inclined to regard all deviations from obvious attention as personal matters or affronts; experienced lecturers learn to regard such things objectively.
11. Cultivate a good time-sense. The time usually seems much longer to your hearers than to you. Avoid digressions; they often serve as distractions rather than illustrations.
12. In some subjects, pupils should be trained to take intelligent and useful notes. Illustrate occasionally by taking notes on your own talk on the board. Encourage the pupils to "write up" notes at the conclusion of the talk, and allow time for such an exercise. A good device is to permit students to work in pairs, or to consult each other while writing.
13. Hold your pupils definitely responsible for the content of talks and lectures.
14. Check up on what the pupils have learned from your talks, as a means of diagnosis and as an aid in remedial teaching. A short test immediately at the close of the lecture, or at the

beginning of the next period, may be used for this purpose, and may serve also as an inducement to careful attention.

Reading as a form of telling. Another method of imparting information, more useful in some subjects than in others, is that of occasionally reading to the class. Since reading does not possess all of the advantages of speaking and has some decided shortcomings, it is not widely used. Ordinarily where the material is available to the student he should read it for himself. However, there are occasions where reading to a class is preferable. These occasions are:

1. Where the material or style is so difficult as to need explanation, or vocal interpretation.
2. Where interest may be aroused which will lead to further reading on the part of the student.
3. When the material read is used as an illustration of a point in the class discussion.

There are several suggestions which should be observed in reading to class. These may be summarized, as follows:

1. The reader should be sufficiently familiar with the material to make unnecessary a close study of it as he reads. He should mark notes in pencil in advance to indicate emphasis, pauses, etc.
2. The reader should pause at intervals for questions and reactions by his hearers, and for comments of his own.
3. Points should be noted in advance where discussion or questioning should be interspersed.
4. The reader should assume as nearly as possible a conversational tone and a personal expression and manner.

The textbook. Telling may be done orally, or by means of the printed page. Telling by print has several advantages over lecturing, as:

1. More careful organization characterizes the printed material. There is no means that equals a good textbook for the logical organization of material.
2. The printed page serves as a permanent record for future

reference. Unlike the situation where one listens to a lecture, the reader may re-read portions of the printed discussion at any time.

3. The gathering of the information may be done out of class, and class time conserved for discussion, explanation, interpretation, and assignments.
4. Textbooks possess many valuable pedagogical devices which should be utilized by the teacher and the student, such as illustrative material, maps, pictures, diagrams, outlines, indices, tables of contents, summaries, paragraph and marginal headings, problems, exercises, collateral references, and suggestions to teachers and pupils.
5. Whatever advantages accrue from uniformity of material among pupils favor the use of textbooks.

Textbook teaching. Textbooks may be employed in such a variety of ways that a complete discussion of the technique of using the textbook would involve a discussion of almost all the various methods of teaching, assignments, class discussions, reviews, and, in fact, little short of a complete discussion of teaching methods. There are, however, certain suggestions as to textbook use which might be appropriate here.

Perhaps the first thing that most progressive students of teaching method would say with reference to textbooks is that teachers are by far too dependent upon them, in that they teach from them blindly and without any effective consideration of the aims and values for their subjects of the textbook itself. Textbooks relieve the teacher from planning the instruction and to a certain extent from planning the methods of instruction. This service, while valuable to the teacher, has at the same time contributed heavily to reducing teaching to the unthinking, impractical, and ineffective level upon which much of it is carried on. It has paved the way for the "recitation-testing" evil which has fastened itself so firmly on teaching in American schools.

Yet this need not be so. Textbooks, if rightly and intelligently used, permit of a tremendous saving of time and energy to both teacher and pupils. They furnish outline, organization, and facts almost beyond number, the task of working up even the main part of which, if left to the individual teacher or even the individual school, would constitute a very heavy burden.

The difficulty lies in the fact that the teacher, all too frequently, fails to realize that a textbook is an outline or a compendium of the most important facts. The amount of material, for example, which an ordinary student should read in a year, in a class in ancient history, should not be confined to the covers of one book, or two, or even four. Much more effective and much more interesting is the supplementary material which gives body, filler, meat, life, background, and interest to the "three-pages-a-day" textbook assignment. It is no wonder that high school pupils rebel at the task of reading textbooks with no supplementary material. Put yourself to the test by starting off what might otherwise have been a pleasant evening by reading a current textbook on history or science. Note how quickly you are irritated by the incompleteness, the encyclopædic nature of the work; how soon you become bewildered with its kaleidoscopic race of events, names, dates, places, definitions, and summaries. Most people would prefer to read fifty pages of interesting material treating of one event, movement, phenomenon, or man, generating some interest in it, than to retrace four or five pages of a highly condensed and encyclopædic textbook. By so doing, not only is the work made more pleasurable, but a better grasp and a more complete understanding is much more likely to result, owing to the more complete background of details and the resulting higher level of attention.

Suggestions on technique of textbook teaching. Skillful

textbook teaching involves skillful questioning, assignment, review, drill testing, problem solving, and appreciation procedure. While discussion of technique in these procedures will be made in later sections of this book, the following suggestions which are special to textbook teaching technique will be given here:

1. Supplement the textbook in content subjects with collateral readings, visual aids to instruction, and short talks.
2. Teach the pupils how to find the materials in the text. Teach them how to use the Table of Contents, the Index at the back of the book, the marginal headings, the paragraph headings, and the other devices which display the organization of the materials.
3. Occasionally, if not frequently, have topical discussions by individual pupils of the various subdivisions of the day's work. This rapidly disappearing device is in many ways superior to a choppy question-and-answer method of recitation.
4. In the daily recitations, where the topical recitation or other method providing for larger pupil-discussion is used, permit the students to recite with books open.
5. Some teachers and writers recommend a rapid, introductory, bird's-eye survey of the textbook by the class, as a framework into which the course may be woven. Such a procedure aids in getting a proper perspective at the beginning, and in obtaining an idea of the relationship and relative importance of the divisions within the book. This procedure naturally is much better adapted to textbooks in the content subjects than to those in foreign languages and mathematics.
6. Assignments should be made which will guide the pupil in his approach to the textbook lesson — leading him to see the importance of the points of chief value, giving him standards of mastery, and pointing out to him the problems involved.
7. The teacher should teach the pupil how to read for mastery; how to interpret, evaluate, and supplement the thought of the author; and how to read rapidly, how to skim, and how to organize and summarize.
8. Care should be taken that sufficient material, not known to all of the class, is introduced by the instructor or by other pupils,

so that there may be obviated that deadening influence on class interest and activity which results when the material brought out in class is already thoroughly familiar to the pupils. Some teachers have met this situation by having different groups within the class use different texts, and then assigning the advanced work by topics and by problems instead of by pages.

Collateral readings. Until the time comes, if it ever does, when small and encyclopædic textbooks give way to large, full, complete, and interesting treatments, from which all the interesting and attractive detail — the problems, the human phases, the personal and biographical material, the interesting descriptions and the like — have not been trimmed out, we must resort to the use of much supplementary material.

The values of collateral reading are not to be confined merely to enriching the minimum of material found in the textbook, or the increased interest of the pupil because of the attractiveness of the detail. Skill in the use of supplementary books, in finding related material, judgment in selecting pertinent materials, and the habit of reference, as well as skill in using works of general reference, may all alike be developed by such a procedure. Encouraging young people to browse among books without definite assignments of things to "learn" has attractive possibilities. The development of special interests by such opportunities, and the development of recognition on the part of young people that books, other than light fiction, may be consulted and read for pleasure as well as through a sense of duty, are not insignificant outcomes of collateral textbook teaching.

In many instances much is to be gained by having the student come into contact with different viewpoints expressed by different authors. Often it is better to read two different descriptions or explanations than to read one twice.

Interest is preserved and a clearer understanding is likely to result from two somewhat different treatments. And again only by having different presentations may the student receive practice in the art of judging the relative value of inconsistent statements or differences of written opinion.

Using collateral readings. Among the ways in which collateral readings may be used to advantage are:

1. The class may be given definite assignments by pages and books, for which all are to be held responsible. This is but an extension of textbook teaching, but it is often useful in widening the scope of material and in introducing new or different viewpoints or treatments.
2. The class may be given, from time to time, a list of supplementary materials from which they may select what they wish, being responsible not for pages but for the mastery of topics, problems, or questions. This plan is very much to be commended in instances where the grip of the teacher and subject on the class is sufficient to insure that a considerable portion of the class will search in the extra-text materials. The freshness resulting from the contribution of material not found by others, and the pride engendered in the contributor, add greatly to the interest and life of the class.
3. Individual reports should be used much more than is commonly done. In this fashion the brighter individuals may be given additional opportunity, and often the uninterested student may be caused to take interest in the work if an assignment of a particularly attractive type is given to him. It is unfortunate that many high school teachers do not know the literature of their subject well enough to do this sort of thing successfully.
4. Collateral reading may be employed in planning flexible or differentiated assignments.
5. Where the problem or project method of teaching is employed, collateral reading in connection with the problem or project is not only desirable, but more often than not it is, indeed, necessary.

Care should be taken that students are not led to feel responsible for more outside reading than they can do

successfully. In the high school about one hundred minutes a day, including the class period, is all that can be expected from the conscientious pupil of average ability. About forty-five minutes a day, on the average, is about all that the average child will spend, outside of class, on any one subject. Twenty to forty pages an hour is a fair measure of the reading rate of a high school pupil, depending, of course, upon the number of words to the page, the difficulty of the style and thought, and the thoroughness with which the material should be read. Where material may be skimmed, even as high as a page a minute can be averaged.

While at times some record of the chief points of what has been read should be kept in the form of notes or outlines, for future use in making reports or for comparing with other readings, or for tests, and while students should be taught how and encouraged to do such note-taking, the practice of requiring notebooks and outlines to be handed in as a check on the outside reading is of very doubtful value. The spirit in which such notes are usually taken is not favorable to careful supplementary thinking, the processes become mechanical, the burden often becomes oppressive, and as often as not the notebook work operates to destroy an interest in the subject. If not carefully handled, individual reports, too, may become a bore to all concerned. They require much time, they are likely to be done rather awkwardly, and the interest and attention of the class soon become difficult to hold. Occasional questioning of students who are doing individual investigation for additional points or information, as may seem natural and of interest to the class, may be substituted for complete formal reports.

Other methods of teaching information; developmental methods. In the foregoing discussion there have been considered oral telling, the use of textbooks, and the use of collateral or supplementary references as means of teaching

information. These represent the authoritative methods of teaching, listed on page 4. A very large share of the information we acquire, though, comes to us through direct sensory experience, rather than through verbal symbols. The chief avenue of direct sensory impressions, as employed in school work, is the eye. The discussion of visual instruction is reserved for a later chapter.

Quite in contrast with the authoritative methods of teaching we have so far described are the other types of teaching methods, also listed on page 4, and which we there termed developmental methods.

Developmental methods deserve adequate consideration because of their special and peculiar values. Valuable as means of teaching information, they are especially adapted to training pupils in those priceless abilities in, attitudes toward, and habits of thinking through problems for themselves. Types of developmental procedure — the problem method and project teaching — are too important to be discussed briefly at this place, so we defer their consideration to two later chapters.

2. The retention of information once imparted

Factors operating in retention. Quite often information once imparted remains with us; still more often it does not. Information is retained in the sense that our neural tissue is so modified that the mental content may be experienced again without the original sensory stimulus being actually present. It may be recalled and we are able to recognize it. This we call memory. Whether every experience permanently modifies the tissue involved so that there is always the possibility of recall, or whether only a portion of experience so modifies the tissue that retention is permanent, is not definitely known. We do know, though, that much that we experience we cannot recall. Whether this is

due to failure of retention or failure of recall, in any one instance, we cannot say with any certainty.

The school pupil does not retain all the information he once has had in mind, or, if he does, he is not able to recall it. To be sure much of what he has read, of what he has been told, of what he has experienced directly — visually, or otherwise — and much of what he has developed for himself inductively or deductively, he is able to recall after an interval.

Certain factors seem to operate to select what shall be retained after once being experienced. The more vivid the experiencing of the information was to the pupil, the more permanent the possession of it will be. Factors contributing to vividness are:

1. Physical attitude of attention.
2. Keeness of interest in the experience at the time of its reception.
3. The physiological state of mind and body — freedom from fatigue, normal health, etc.
4. Freedom from distraction due to the demands of other sensory stimuli.
5. The sensory content of the experience — its loudness, richness, etc.
6. Its natural significance for us — its obvious ability to do us immediate harm or good.
7. Its striking novelty.
8. Its emotional effect upon us — pain, joy, excitement, etc.

Methods which make the experiencing of information vivid to us contribute to retention. Most of us are unable to make the original presentation of experience sufficiently stimulating or of sufficient vividness to insure permanence. This fact has its virtues, as well as its faults. We must resort to other devices for that which we wish to make permanent. While rules, principles, and concepts developed deductively are more likely to be retained, even these need special treatment to insure permanency.

Repetition for retention of information. There are certain rather valuable suggestions to be kept in mind by way of helping pupils to "fix" information. A detailed discussion of suggestions for memorization is given in another chapter (V), and they will not be repeated here. It will suffice to say here that the following suggestions are important for the teacher to keep in mind:

1. For most people, things to be remembered should first be clearly understood. That which is to be memorized should first be studied for thought.
2. If there is any definite sequence in the items to be memorized, as in a poem, a description, or a narrative, such should be picked out and set before the pupil as a framework. Outlines are very helpful here.
3. If there is no natural sequence of organization, often an artificial one may be worked out which will be helpful.
4. Search should be made for other types of associations which will assist memory, such as peculiarities, resemblances, contrasts, alliterations, and relations of all sorts.
5. Repetition should be interspersed with recall. After a reasonable number of repetitions recall should be attempted, referring to the copy as needed.
6. After the first stages, repetition should concentrate upon the weak spots; efforts should be made to devise special associations for these.
7. Repetition should not continue after the ability to concentrate has materially diminished.
8. Care should be taken that mistakes do not creep in. These should be corrected at first appearance.
9. Intervals between learning periods should not be too great in length — in the early stages, not more than two or three days each, and preferably not so great. One or two practice periods a day are better than more.
10. In drilling a class as a class, it should be borne in mind that learning is individual. Individual diagnosis and treatment is decidedly economical. The maxim, "Do not drill the few at the expense of the many," may also be reversed to read, "Do not drill the many at the expense of the few."
11. For permanent retention, overlearning and continued occasional review are indispensable.

12. Do not complicate the learning situation too early; that is, do not add new material too rapidly.
13. Application of information learned should replace abstract drill, after the first stages of learning are past.

Levels of mastery. There should without doubt be at least two levels of mastery as goals of drill for learning information. These may be stated as:

1. A reasonable familiarity or temporary memorization, intended to permit progress at the time; that is, sufficient familiarity with the minor items of a history lesson to give desirable general impressions and to facilitate discussion, but which it is not expected that many will carry through life at ready recall.
2. That complete and permanent mastery which will make possible ready recall, at future times, of those important facts which in all likelihood will be of service to us in situations where looking them up will be either impossible or impractical.

It is important that the teacher distinguish between these two levels in determining the limits and standards of drill work.

3. The acquisition of habits and skills

Relation to the laws of learning. In many ways the acquisition of habits and skills, and the technique of developing such in connection with school teaching, is similar to the fixing of information. Both have a common fundamental basis, and both are subject to the same laws of learning. In fact, while earlier books and other treatments of learning differentiated quite definitely between memory on the one hand and habits and skills on the other, more modern authors discuss both types of outcomes together and in connection with the general nature and laws of learning. The law of use, in its various aspects of activity, frequency, and recency, governs both outcomes quite as clearly as do

the laws of effect, intensity, association, apperception, and readiness. That is, one acquires either information or habits — skills may be regarded as a type of habit — only by activity and use. Frequency of use, other factors being constant, contributes to permanence and accuracy of response. The more recent the learning or practice, the more certain that the habitual response will take place, and the more accurate and ready will be the skilled responses. The more pleasing the consequences of the response to be made automatic, the more ready and certain the particular desired response becomes and the more quickly skill may be developed. The more attentive we are to the training situation, the more quickly the habit of skill may be developed. Habit and skill can be acquired only by association. Habit or skill means little more than the establishing of bonds between response and stimulus so firmly that one automatically follows the other. What one learns, or how rapidly one learns, depends in the case of habits and skills, as well as in memory, upon previous experience and its conditioning factors, helpful or interfering. The law of readiness operates to condition or determine responses, and their effect on motor as well as on ideational learning.

Suggestions on technique of developing habits and skills. There are certain suggestions which apply particularly to the development of habits and skills that are of importance to the teacher:

1. The learner should have in mind a clear idea of the response to be made.
2. In the case of complex responses or activities, the learner should be furnished, separately, an explanation or demonstration of the activity in parts or elements. For example, in teaching correct pronunciation in a foreign language, there is often need for discussing the position of tongue and throat-opening, and similar elements of the procedure of pronouncing the particular words or sounds.

3. Care should be taken in the early stages that wrong or incorrect responses are not practiced, and that there are no exceptions. Inaccurate responses should be tolerated only when due to the inability of the learner at the time to do better.
4. Practice periods should last only as long as whole-hearted response can be obtained. When fatigue or ennui sets in, either the practice period should be brought to a close, or devices to revive interest introduced.
5. Practice periods should rarely be scheduled for more than twice a day, and in the early stages not further apart than every other day. Frequently repeated practices are more profitable at the start than later.
6. All drill is individual. Observation and detection of individual errors should be made, and practice thereon prescribed. Some should not be drilled at the expense of others.
7. A favorable attitude of the learner toward the practice should be maintained. As far as possible the learner should be kept interested, encouraged, and in good humor.
8. Knowledge of the goal and of progress toward it are favorable to interest and rapid learning, except where the progress is so slow as to discourage or confuse the learner.
9. Habits and skills should be acquired in situations as nearly as possible like those in which they will be used.
10. Except in those instances where the response to be habituated, or in which skill to be acquired is so difficult as to defy learning, "crutches" should not be used; that is, only in such instances should methods or responses be incorporated into the learning which will later have to be unlearned.
11. Adjust the pace of drill to circumstances — the maturity and development of the learner, and the complexity of the response. Drill should be snappy and peppy, but not so fast as to encourage errors or to discourage the learner.
12. Immediate interest must be maintained. The dogged hope of eventual reward is not enough to produce favorable learning environment. Variations of procedure, time-contests, group-contests, objective standards, vigorous leadership, and a sense of humor are all helpful.
13. The instructor should determine what degree of thoroughness is desirable for the habit or skill, that time be not wasted in continuing drill after the determined level has been reached. On the other hand, it is desirable to continue drill or some

- skill to the point of "overlearning" as a means of insuring permanency.
14. Skills should be occasionally reviewed to offset the inroads of forgetting.
 15. Select for especial drill and attention those parts which indicate special weakness.
 16. Always subordinate speed to accuracy in the early stages. The fact that rapid performers are accurate performers does not mean that, for a given individual, the more rapidly he works the more accurate he will become.

4. Acquiring ideals and attitudes

Information and skills vs. attitudes. The psychology of developing ideals and attitudes is not so well developed as that of imparting information, or that of developing habits and skills. Unlike information and skills, ideals and attitudes cannot always be approached directly and in a simple fashion. The learning of a date, or a rule, or any sort of fact, or the acquisition of a skill, is a thing which may be assigned as a lesson for a day or a week or a month, and teacher and learner may proceed consciously and directly to facilitate the learning process.

Ideals and attitudes do not lend themselves well to that procedure. It is perhaps because information and habits and skills are more easily adapted and fitted into the formal and somewhat artificial atmosphere of the school, that they have been emphasized out of proportion to their value in an educational program and their influence upon human behavior. Yet, upon impartial reflection, it is clear that ideals, attitudes, and interests are powerful influences and determinants of human and social progress and happiness, and that, once acquired, they continue to function long after the great bulk of information has sunk below the level of ready recall.

Concomitant incidental outcomes. It is important that the teacher remember that while ideals, attitudes, and

interests may be determined somewhat by the teaching of school subject-matter, they are also very easily influenced by all forms of school experience. Every class period leaves its impress, either positively or negatively, upon ideals, attitudes, and interests of the pupils. Young people in school are constantly forming and modifying their attitudes — attitudes toward school, literature, art, music, history, or other types of subject-matter; attitudes toward religion, political parties and issues, vocations, and various leisure occupations; attitudes toward individuals, the opposite sex, and toward education; tastes or prejudices toward school subjects, methods, and what not. Standards and ideals of honesty, of good appearance, of correct speech, of what constitutes education, good-fellowship, and vocational success, of industry, of thrift, of physical excellence, and scores of other attitudes and ideals are conceived or modified by instruction in science, algebra, history, French, and the other school subjects.

The ideals and attitudes of high school pupils also take nourishment from the ideas and conduct of their fellow pupils, and the standards of their fellows and of their teachers as they come to know them in the daily school work. They also spring up out of reflection and day-dreaming, stimulated by the reading of biography and literature or other thought-stimulating material. They seize upon the child in his contemplation of the teacher and his attractive and unattractive qualities. The fairness, patience, forcefulness, aggressiveness, pleasantness, democracy, sympathy, neatness of appearance, masterliness, frankness, poise, and good judgment of a classroom teacher do much to help shape ideals and attitudes with pupils. They also may have their origin in or be fed by all sorts of student activities, such as athletics, dramatics, debate, student government, classroom organizations, and musical and journalistic enter-

prises. They are continually being strengthened or reshaped by experience within and outside the class.

Attitudes, interests, and ideals through the curriculum. The opportunities for generating or modifying these outcomes of teaching are to be found in large number in the curriculum and the direct class work of the school. Among the objectives of literature, history, civics, and the sciences is the development of ambitions, standards, desires, tastes, prejudices, opinions, and interests. These all belong to the category we are now considering. In foreign languages and mathematics, ideals and interests of various sorts are aimed at. Though not so commonly recognized among the objectives of household arts and science, the development of tastes, interests, prejudices, and standards should be emphasized here as well.

No better opportunity for determining the future attitudes of young people on moral and ethical questions, for educating the emotions and the feelings, or for developing desirable interests and appreciations, can be found than in the study of the works of the masters in literature, music, and art. The possibilities of science for developing useful and desirable interests are almost unlimited.

Technique of the appreciation lesson. The technique of developing all these desirable qualities is not subject to accurate analysis and description. In fact, not all the desirable qualities have been identified or agreed upon. The technique of their cultivation is almost as broad as the technique of influencing human behavior. There are, however, suggestions as to procedure which seem to be effective where a direct procedure is to be employed, and where a definite attempt is to be made to develop directly, through the class work of the day, an attitude or interest in and an appreciation of the subject-matter — as literature, art, and music — being studied. The following suggestions

as to procedure will prove useful to teachers in conducting this type of teaching:

1. Employ subject-matter appropriate for the age and maturity of the pupils. Developing taste is a slow process, and the level of subject-matter cannot be elevated abruptly with success. Subject-matter beneath the level of development of the child is likewise ineffective.
2. The instructor should show some enthusiasm for the material — not effusive or gushing, but sincere appreciation.
3. Care should be taken to avoid over-analysis. The mechanical dissection of a beautiful piece of literature is not likely to arouse the desired appreciation.
4. Do not force the student to express his reaction. While opportunity should be provided for spontaneous expression, and while such expression should be mildly and judiciously commended, no pressure should be brought to bear. A premature expression, especially if forced, is likely to be unfavorable or hypocritical. It must be remembered that the better tastes develop slowly.
5. Do not attempt to standardize results in developing appreciations. Tastes differ, and develop unevenly. Wide individual differences must be expected, and these will require patience and careful procedure.
6. Students should not be talked into "appreciation." Appreciation should grow out of direct experience. Pupils should be led to discover points of beauty or enjoyment, and not have these thrust upon them.
7. The possession of productive technique may enhance appreciation, and usually does, but compulsory training in productive technique may develop attitudes which will hinder the development of the desired attitudes or interests.
8. Ideals are best acquired in the concrete. Performance, even if fictitious or imaginary, is superior to abstract concepts.
9. Care must be taken to prevent digression or distraction which will arouse conflicting or incongruous feeling-states.
10. Care should be taken to keep in the background the intention of the teacher to develop appreciation.
11. Appreciation of thought should not be sacrificed to appreciation of form; the former is spiritual, the latter sensual.
12. Newly found interests and tastes should be cautiously di-

rected into satisfying activities. Care must be taken, however, not to force these. Haste never made waste more certainly.

13. If after a fair "exposure" the material used does not bid fair to arouse favorable attitudes, persistence may not avail anything. A change of diet may serve much better.
14. As far as possible, the student should find the moral, the thing of beauty, for himself. Ideals are naturally discovered; they are rarely taught. Moralizing is ordinarily unwise and to be avoided, even though the work of the hour appears otherwise wasted.

The alert teacher will find many incidental opportunities for little touches that awaken interest and appreciation in subject-matter and which tend to form desirable attitudes and develop worthy ideals. The most effective approach to these subtle outcomes of teaching calls for the touch of the artist teacher, but an artist teacher every high school teacher should strive to become.

A summary of most effective technique for use in training pupils for study for appreciation and enjoyment will be furnished in Chapter V, on Teaching Young People how to Study. In continuing the consideration of the technique of developing the outcomes of teaching we will turn, in the next chapter, to the treatment of effective technique in certain standard recitation devices and procedures, namely, questioning, the assignment, and the review. Mastery of these elements of standard teaching technique is essential for classroom success, whatever procedures may from time to time be employed.

QUESTIONS AND EXERCISES

1. Which of the points in favor of developmental methods, and which in favor of the authoritative methods, do you regard as weak or doubtful?
2. Is there much opportunity for the use of developmental methods in the subject of your specialty? Give reasons for your answer.

3. Add three more suggestions to the fourteen given on pages 9-11 on how to tell or lecture.
4. Add one more suggestion to the four given on page 11 on reading as a form of telling.
5. Of what importance would you say collateral and supplementary reading are in your subject of specialization? How would you use them? What sort of references would you use?
6. Go through the thirteen suggestions given in the paragraph headed, "Repetition for retention of information," on pages 20-21, and label each as (1) absolutely true, (2) most likely true, (3) doubtful, (4) fallacious, or (5) true but there are exceptions.
7. Think out an illustration of applying or failing to apply properly the suggestions for the technique of developing habits and skills, numbered 2, 7, 8, 9, 10, 11, and 13, on pages 22-24.
8. What opportunities are there for developing ideals or attitudes (interests or appreciations) in the subject of your specialty?
9. Explain in more detail, giving examples where possible, the suggestions given on the technique of the appreciation lesson.
10. What do you think of the relative importance of the concomitant incidental outcomes of teaching as compared with the direct outcomes of teaching? Give examples to illustrate your opinion.

SELECTED REFERENCES

Betts, George Herbert. *The Recitation*. Boston: Houghton Mifflin Co., 1910.

Pp. 19-24, fixing information and developing skills and habits; pp. 45-48, values and technique of telling.

Charters, W. W. *Methods of Teaching*. Chicago: Rowe, Peterson & Co., 1912.

Pp. 266-68, values and technique of telling; pp. 268-76, developing methods of imparting information.

Colvin, S. S. *Introduction to High School Teaching*. New York: The Macmillan Co., 1917.

Pp. 295-309, developing methods of imparting information; pp. 224-33, values and technique of telling.

Davis, Sheldon Emmor. *The Work of the Teacher*. New York: The Macmillan Co., 1917.

Pp. 174-81, fixing information and developing skills and habits; pp. 174-81, values and technique of telling; pp. 181-82, developing ideals and attitudes.

Foster, Herbert H. *Principles of Teaching in Secondary Education*. New York: Charles Scribner's Sons, 1921.

Pp. 173-87, developing ideals and attitudes.

Handschin, Charles H. *Teaching of Modern Languages*. Yonkers, New York: The World Book Co., 1924.

Pp. 43-52, values and technique of telling.

Holley, Charles E. *The Teacher's Technique*. New York: The Century Co., 1922.

Pp. 115-38, developmental methods of imparting information; pp. 139-58, fixing information and developing skills and habits; pp. 151-58, values and technique of telling; pp. 150-81, developing ideals and attitudes.

Minor, Ruby. *Principles of Teaching Practically Applied*. Boston: Houghton Mifflin Co., 1924.

Pp. 163-75, developmental methods of imparting information; pp. 191-211, fixing information and developing skills and habits; pp. 212-27, developing ideals and attitudes.

Nutt, Hubert Wilbur. *Principles of Teaching High School Pupils*. New York: The Century Co., 1922.

Pp. 247-52, values and technique of telling; pp. 253-57, the use of textbooks and collateral readings.

Parker, Samuel C. *Methods of Teaching in High School*. New York: Ginn and Co., 1915.

Pp. 142-66, fixing information and developing skills and habits; pp. 418-36, the use of textbooks and collateral readings; pp. 232-67, developing ideals and attitudes.

Sharp, Frank C. *Education for Character*. Indianapolis: Bobbs-Merrill Co., 1917.

Chapter XIV, Moral Instruction through the Existing Curriculum; Chapter V, Moral Instruction through Biography.

Stormzand, Martin J. *Progressive Methods of Teaching*. Boston: Houghton Mifflin Co., 1924.

Pp. 70-85, developmental methods of imparting information; pp. 227-52, fixing information and developing skills and habits; pp. 1-67, the use of textbooks and collateral reading; pp. 175-98, developing ideals and attitudes.

Strayer, George D. *A Brief Course in the Teaching Process*. New York: The Macmillan Co., 1911.

Pp. 51-77, developmental methods of imparting information; pp. 41-50, fixing information and developing skills and habits; pp. 207-11, values and technique of telling; pp. 78-85, developing ideals and attitudes.

Twiss, George R. *Teaching of Science*. New York: The Macmillan Co., 1912.

Pp. 139-41, values and technique of telling.

Waples, Douglass. *Procedure in High School Teaching*. New York: The Macmillan Co., 1924.

Pp. 169-82, fixing information and developing skills and habits; pp. 203-14, developing ideals and attitudes.

Williams, Jesse F. "The Education of the Emotions through Physical Education"; in *Teachers College Record*, vol. 21, pp. 201-16. (May, 1920.)

CHAPTER II

QUESTIONING, ASSIGNMENT, AND REVIEW PROCEDURE

1. *Questioning as a teaching procedure:* Wide use of the method — Functions of questioning — Questioning and the outcomes of teaching — The nature of “good” questioning — Wording must be clear — Must be adapted to pupil — Should definitely describe task of pupil — Should conform to instructor’s purpose — Avoid wording and organization of textbook — Should involve thought and organization — Types of thought questions — Unity in questioning — Procedure in questioning — Handling of answers — Pupils’ questions — Socratic questioning.
2. *Lesson-assignment procedures:* Need for effective assignments — Causes for such defective procedures — Essentials of an effective assignment — Criteria of effective assignment procedure — Time for making assignments — The question of daily *versus* longer assignments — Planning for assignments.
3. *The review procedure:* Place of the review in teaching — Purposes of the review — Occasions for review — Technique of the review lesson — The problem review — The socialized review — Review quizzes. Questions and exercises — Selected references.

1. *Questioning as a teaching procedure*

Wide use of the method. Easily the prevailing type of teacher-and-pupil classroom activity is the question-and-answer procedure. If one walks into a classroom in a typical school one expects to find the teacher asking questions, and the pupils answering them. Despite the steadily growing tendency to replace the question-and-answer type of teaching by more advanced methods, as supervised study, visual instruction, socialized recitations, and problem-project activities, and the tendency to minimize recitations as such, it is probably true that questioning, interspersed with telling in the way of correcting or supplementing answers, still occupies as much class-period time as all the other types of teaching combined. It must not be inferred

from this statement, though, that the question-and-answer method is one that has been outgrown and ought to be discarded. On the contrary, it is still, and probably always will be, an important teaching method, and if properly handled this mode of conducting classroom activities may be made to contribute quite effectively to the aims and ends of teaching. As a method it has large possibilities for use, and it is unfortunate that a teaching method of such large possibilities is generally so poorly manipulated.

The reasons for this situation are not hard to find. The short period of service of so many teachers means that a very large percentage of the teaching force must of necessity consist of novices. These often begin their teaching work without adequate technical training, and often they have had no opportunity to witness and study the technique of older and expert teachers. As a consequence, the beginners imitate the teaching methods of their high school or college teachers, as they are able to recall them. The beginning teacher, too, depends largely on the textbook as a source of information and guidance, and the classroom quiz on textbook lessons previously assigned becomes for the beginner the almost natural method of procedure. The problem for every beginning teacher, then, is both to attain a mastery of the questioning method, and to learn other teaching methods to supplement this form of procedure. Questioning may be made a very effective means of stimulating and guiding thought on the part of learners, and skill in questioning is very much to be desired.

Functions of questioning. The uses and values of questioning as a teaching procedure should not be thought of as being limited to testing. There are other important functions of the question-and-answer procedure which should be recognized, and which questioning should be employed to realize. Among these are:

1. To discover weaknesses of the class and of individual pupils in:
 - a.* Familiarity with the content.
 - b.* Correct understanding of material.
 - c.* Methods of thinking.
2. To provide practice or drill on material.
3. To direct attention to important points and phases of work.
4. To give organization to material studied.
5. To stimulate interest in work at hand by arousing curiosity, raising problems, etc.
6. To stimulate thinking on the part of pupils:
 - a.* In developing subject-matter.
 - b.* In applying subject-matter.
7. To discover interests of pupils.
8. To furnish incentive for careful preparation by careful checking.

The possibilities of the question-and-answer method for teaching, drilling, guiding, and stimulating should not be obscured by, or even subordinated to, the use of the method for the purpose of testing only. Questioning carried on as a means of accomplishing other ends will incidentally discharge its testing function.

Questioning and the outcomes of teaching. While employed largely as a means of stimulating and testing the learning of information, the questioning procedure may be used as well to develop the different types of outcomes of teaching we have previously mentioned. Though questioning perhaps contributes more directly to the development of information and appreciations, the development of habits and skills of all sorts may be facilitated by questioning. The degree of development of such may be tested by questioning which brings forth a performance which may be judged, and interest in improvement also may be stimulated. Training in thinking, in problem-solving, and in generalizing may be given very effectively by questioning. Since this is one of the most valuable possibilities of the question-and-answer

procedure, questioning should be so carried on as to furnish training in meeting and attacking problems — that is, seeing clearly and definitely the problem and its exact nature, planning the attack, guiding the procedure and discouraging premature conclusions.

As a means for training in cool and systematic thinking, learning to avoid the pitfalls of analogy, and keeping from succumbing to emotion and prejudice and sophistry, good, skillful questioning on the part of the teacher can hardly be improved upon. The habit of thinking twice before speaking, the habit of restraining one's self in cases of doubt, and the habit of considering alternate possibilities, along with many others, may also be developed by good questioning procedure. The recitation affords an excellent laboratory where mind may meet mind, and training in the arts of thinking and oral expression may be developed there under most natural and favorable circumstances. Skillful questioning plays no little part in this development.

In the development of the more subtle types of outcomes — the development of attitudes, ideals, and interests — the use of suggestion is to be preferred to the employment of more direct methods, and the question lends itself admirably to such procedure. Young people must be led and not pushed into appreciations. Ideals are not taught by rote, but are the result of experience which has suggested the emotionalization of standards. In stimulating thought on these matters, the questioning procedure is decidedly appropriate, when skillfully and modestly handled. The development of tastes cannot ordinarily be accomplished by authoritative methods, but rather by leading the pupil into experiences which he may be caused to analyze for points of merit, beauty, and enjoyment. These must not be thrust upon him; he should "discover" them. The rôle of questioning here is not difficult to see.

The nature of "good" questioning. The first consideration, with respect to what constitutes a good question, is the extent to which it is adapted to the aims and purposes of the subject-matter being developed. A sense of relative values is fundamental to good questioning. Teachers are too much given to the practice of asking trivial and insignificant or detached questions, because they are definite, while the big and the vital problems seem to escape them. Colvin has pointed out that this is particularly true in the teaching of literature. The writer finds it almost as common in the teaching of history. Among other considerations relative to good questioning, the following should be mentioned:

1. *The wording of the questions should be clear.* When questions are formulated in class instead of having been thought out in advance by the teacher, there is always the likelihood that the questioning may be involved and confusing. Qualifying and explanatory clauses are likely to occur to the questioner after he has begun to phrase the question, and by the time it is finished it may have become difficult for the pupils to hold in mind all the ideas involved. Digressions, comments, or parenthetical statements should be employed but rarely in the statement of questions. Brevity and directness are qualities to be sought for.

Teachers suffering especially from this difficulty should formulate in advance a number of questions which are certain to be clear. If questions asked in class turn out to be involved or confusing, it is wise to re-word them, and to give such assistance to pupils as will enable them to get before their minds all the conditions of the question. Only a sense of injustice will result from passing from one pupil to another in the hope of discovering one who has grasped the significance of an involved question.

2. *The question should be adapted to the age and maturity of the pupils, and to their previous training in the subject at*

hand. The vocabulary employed should be so adapted to the understanding of the class that they may be expected to grasp the full significance of the question. Only when the questioner proposes to teach the meaning of new words should this rule be departed from.

3. *The question should definitely describe the task of the pupil.* "What about" questions are common offenders. Questions which do not define the problem, such as "What caused the entrance of the United States into the World War in 1917?" should be put with the emphasis so placed that there will be no question as to whether the task is to tell why the United States entered the World War, or to tell why it entered the War at that particular time. Better still, the confusing item of the date might be omitted entirely.

4. *Questions should conform to the immediate purpose of the instructor.* That is, the questions should be shaped somewhat differently when the purpose is to test for facts, to stimulate discussion, to provoke opinion, or to lead up to and establish a favorable frame and content of mind for other points. For example, where the aim is to test or to provoke thought or organization, questions which may be answered by "yes" or "no" should be used sparingly. Where the purpose is the recall of ideas, that is, the setting of the scenes for a significant question which is the critical question, "yes" and "no" questions may be well used. The same may be said for alternative questions, such as, "Did President Wilson want a League of Nations, or was he opposed?" and for such suggestive questions as, "Was Henry Clay the author of the Missouri Compromise?" As a means of approach such questions are usable; as a means of testing, because of the large guessing possibilities, they are but poorly adapted to their purpose.

5. *Questions free from the wording and organization of the textbook are much to be preferred.* The undue emphasis upon

memory, and the consequent neglect of powers of organization and application, constitute objections to questions worded as in the textbook, to say nothing of the deadening effect upon interest and initiative of questions of this type.

6. *Questions involving thought and organization represent a superior type of questions.* Where there is a choice between questions which involve merely recall, and questions which involve in addition some thought-comparison, evaluation, or organization, the latter type is usually to be preferred. In instances of rapid memory drill, of course, the former type is excusable. The question which is immediately followed by a wild waving of hands is all too likely to be distinctly inferior to that which is followed first by a period of interested concentration.

Types of thought questions. Considered as to their nature, questions may be divided roughly into three main divisions:

1. Pure recall, or memory questions.
2. Thought questions necessitating recall, and in addition some mental task or reaction with respect to the material recalled.
3. Thought questions in which the large part of necessary facts are furnished the student, and in answering which the task is very little recall but largely reaction.

Professors Walter S. Monroe and Ralph E. Carter, of the Universities of Illinois and Indiana respectively, in a study made by them, have identified twenty varieties of thought questions. A study of their list of varieties should prove very suggestive as to the kinds of thought questions which teachers may profitably use. The teacher who aspires to be a successful director of educative mental activity in the recitation period should include in his repertoire of question-types a large part of the twenty types of questions they describe.

Below are given the twenty varieties, with examples of each, as given by Monroe and Carter.

1. *Selective recall*, basis given.
Name the presidents of the United States who had been in military life before their election.
What do New Zealand and Australia sell in Europe that may interfere with our market?
2. *Evaluating recall*, basis given.
Which do you consider the three most important American inventions in the nineteenth century, from the standpoint of the expansion and growth of transportation?
Name three statesmen who have greatly influenced economic legislation in the United States.
3. *Comparison of two things, on a single designated basis*.
Compare Eliot and Thackeray in ability in character delineation.
4. *Comparison of two things, in general*.
Contrast the life of Silas Marner in Raveloe with his life in Lantern Yard.
5. *Decision*, for or against.
Whom do you admire the more, Washington or Lincoln?
6. *Causes or effects*.
Why has the Senate become a much more powerful body than the House of Representatives?
What caused Silas Marner to change from what he was in Lantern Yard to what he was in Raveloe?
7. *Explanation*. Use of the exact meaning of some phrase or statement in a passage.
8. *Summary*. Of some unit of the text, or of some article read.
9. *Analysis*. (The word itself is seldom involved in the question.)
What characteristics of Silas Marner make you understand why the Raveloe people were suspicious of him?
Mention several qualities of leadership.
10. *Statement of relationships*.
Why is a knowledge of botany helpful in studying agriculture?
11. *Illustrations or examples* (your own) of principles in science, construction in language, etc.
12. *Classification*. (Usually the converse of No. 11.)

What is the principle involved here? What is the construction? To what class or genus does this individual belong?

13. *Application* of rules and principles in new situations.

14. *Discussion.*

Discuss the Monroe Doctrine.

15. *Statement of aim.*

The author's purpose in his selection or organization of material.

What was the purpose of introducing this incident?

16. *Criticism.* As to the adequacy, correctness, or relevancy of a printed statement, or a classmate's answer to a question on the lesson.

17. *Outline.*

18. *Reorganization of facts.* (A good type of review question for purposes of training in organization.)

The student is asked for reports where facts, from different organizations, are arranged on an entirely new basis.

19. *Formulation of new questions.*

Problems and questions raised.

What question came to your mind?

20. *New methods of procedure.*

Suggest a plan for proving the truth or falsity of some hypothesis.

How would you change the plot in order to produce a certain effect?

Unity in questioning. Questioning, as with any other forms of teaching approach, should not be fragmentary or disconnected. The instructor should at the outset visualize a few outstanding points or aims of the day's work. The questioning should then be so organized as to make the development of the day's work contribute most heavily to those aims. Questioning which consists of scores of short, choppy questions, lacking general purpose and unity, is good procedure ordinarily only as a testing device.

Because of the relatively small amount of time which may be spent on careful preparation, this fundamental characteristic of good questioning — that of unity and purposefulness

— is often but poorly realized. Over a class period *questioning* should also be such as will bring out the organization of the material, and give emphasis and perspective. Young people are altogether too likely to see the myriads of units of information as mere isolated items, in spite of the organization attempted in textbooks. It is the work of the teacher to unify and integrate knowledge and thinking.

Procedure in questioning. There are a number of suggestions as to the questioning process which merit consideration. Among them may be mentioned:

1. The pace of the questioning should be adjusted to: (a) the nature and purpose of the question; that is, drill questions may be asked in rapid-fire order, while thought-provoking questions should have ample time allowed for deliberate and unhurried thinking; (b) the relative familiarity of the class with the material covered in the question.

2. As a regular procedure, no special order should be observed in the distribution of questions. To do so invites those least in danger of immediate participation to feel their responsibilities lightly, and may lead to the preparation of only parts of lessons, if the portions likely to be assigned in class to any given individual can be predetermined with a reasonable degree of accuracy.

3. Ordinarily it is better to designate the individual who is to respond to the question after the question has been asked, and after time for formulating the answer has elapsed. By so doing, the number of those thinking the answer through is likely to be much larger than will be the case when the immediate responsibility has been designated to one individual at the outset.

4. Over a fairly large unit of time — a week or so — questions should have been fairly well distributed among the different members of the class. The assignment of questions

disproportionately to bright pupils serves to encourage the delinquency of the slow and the negligent, while the assignment of questions disproportionately to the slow operates to slow down the progress of the instruction, and to bore the brighter students and train them in habits of idleness or mischief. Deviations from any uniform distribution in any day's work is necessary and wise, and to a certain extent also over larger units of time. Many pupils will work well and profit almost as much by recitations in which they participate orally, while others need the stimulus of questioning. Devices used by careful teachers to aid in the distribution of questions are: (a) calling on the pupils from a pack of cards which contain their names, and which are shuffled every day or so; (b) occasionally looking over the class roll and making a list of students who have not been called on for some time.

5. The assignment of questions should also be determined in view of two other considerations: (a) individual differences of ability, and (b) individual differences in special knowledge and interests. As a means of adjusting instruction to individual differences within the class the more definite questions should be assigned to the abler pupils, and the less difficult to the less able. By so doing the abler are stimulated to exert themselves, and the less able are given less opportunity to develop inferiority complexes and to become dissatisfied with school work. When possible, questions should be assigned to certain individuals who are in position to give special or unusual information on the point being discussed, and to those whose special interests are involved. Occasionally, over-confident, superficial pupils should be given difficult questions, and their answers critically evaluated.

6. Questions should frequently be assigned to inattentive pupils. This may serve to interest them, and, if done in a proper manner, avoiding undue antagonizing of pupils, may

lead them, through a sense of pride, to good resolves for the future. This method also serves to warn the class that inattention is being noted, and helps to check it.

7. Ordinarily a question once stated should not be repeated. Pupils should be responsible for their attention during questioning, and yet at times the repetition of the question may be a legitimate request of the pupil. Care at least should be observed to avoid antagonizing pupils unduly through a strict observance of this somewhat general rule.

8. Questions should be, in most instances, asked in a natural, interested, and conversational tone, rather than asked or demanded in a formal, artificial, schoolroom manner.

9. Questions should ordinarily be asked in a manner which indicates confidence in the pupil. Occasional exceptions to this rule are: (a) cases where a good-natured contest between pupil and teacher is carried on, as a developing exercise; (b) cases where a bluffing pupil needs to have his bluff called.

10. The extent to which an individual should be pursued with questions depends upon circumstances. Ordinarily this should be avoided. Where the purpose is teaching, not testing, and where the class may learn from the dialogue of pupil and teacher equally as well as if the questions were distributed, sometimes successive questioning of one pupil furnishes a better opportunity to make the desired development than would the questioning of a number of different individuals. The test here lies in whether the rest of the class is kept interested by such a procedure.

11. The teacher should be sufficiently free from textbook or lesson plan that he may ask questions in a natural, conversational manner, and thus give the class the benefit of his personality and expression.

12. At least a few of the questions asked during a class-hour should have been thought out in advance. These

should be the pivotal questions upon which the development of the lesson turns. Often an excellent "recitation" may be assured by the preparation of a small number of well-thought-out, interesting, thought-provoking questions or problems, about which discussions result which develop the heart of the whole lesson.

Handling of answers. The following is a summary of suggestions for the handling of answers which have grown out of much observation of successful teaching:

1. The amount and nature of commendation or disapproval should be judged by the nature of the response, and the effect upon the class as a whole and upon the individual. Some individuals need and thrive on encouragement and approval; others are spoiled by it. Some individuals require rather frank criticism of their efforts as a stimulus; others are discouraged and antagonized by such a procedure. The latter class is larger, and the former smaller, than most teachers suppose. When in doubt say nothing, or give a dignified approval. The attitude of the class in general toward approval must be borne in mind. Effusive approval is likely to excite disgust or contempt; excessive disapproval to excite impatience.

2. Discretion should be exercised in repeating answers. The instructor should aim to promote the habit, on the part of each pupil, of addressing the entire class, and the repetition of answers should become unnecessary. The unthinking repetition of answers by teachers is largely a matter of habit, and should be avoided. It is not done in out-of-school conversation or discussions, and it serves to waste time and add formality to the classroom discussion. On the other hand answers should not go unheard, and sometimes the delay and irritation resulting from compelling pupils to recite more distinctly is out of proportion to the resulting gain. Incorrect answers should often be modified by the

instructor, instead of being referred to successive individuals until satisfactorily formulated.

3. The employment of "advance" assent or disapproval must be adjusted to circumstances. If the question is for testing purposes, care must be taken not to give the pupil clues in the matter of expression, nodding or shaking the head, or the like. If the material is new or difficult, or if the pupil is timid, some advance encouragement is often in place; if the pupil is carelessly wrong, some halting of his erroneous development is a saving of time.

4. Answers should be in reasonably good English. Good English is largely a matter of training and habit, and the coöperation of all teachers to this end is very desirable. Skill must be employed in taking care of this point, so as to produce the least distraction and interference in the development of the work. Often a puzzled look, a knowing smile, or a lifting of the eyebrows will suffice.

5. Responses of some length should be encouraged, though the long topical recitation cannot be made the uniform procedure.

6. Care should be taken from the outset to discourage that chaotic and discourteous type of recitation procedure characterized by a hand-waving contest. Courtesy, fair play, and reasonable dignity must be preserved, even in the most enthusiastic class.

7. Answers which do not represent the student's best, and which are not the result of careful thought, should not be accepted; still more, they should be discouraged. The habit of deliberate thinking, suspended judgment, and self-criticism should be encouraged and insisted upon.

Pupils' questions. Pupils should be encouraged to ask questions as a lesson proceeds, conceding that they are sincere. There is no better time to give information than as the answer to an interested and sincere question. How far

one is justified in deviating from the previously planned line of development is hard to say, but certainly flexibility in procedure is more effective than many teachers will admit. There is nothing sacred about the artificial organization of knowledge. All else being equal, logical organization is to be preferred, but where it is a choice between warm interests and keen attention on the one hand and the typical perfunctory attention on the other, much of logical organization can be sacrificed to good advantage. Distinction should always be made between this situation and that where the teacher, of his own initiative, or urged on by a class wishing to "sidetrack the recitation," digresses at length without much better attention or interest than the regular work would have commanded.

Care should be taken, in all grades of the junior high and high schools, to keep alive that questioning tendency of pupils which is so prominent in their earlier years. Time can well be afforded in answering sincere questions. To be sure, as pupils grow older they should be trained to find the answers to their questions by reflective thinking or by consulting literature, and thus be trained for more and more independence of teachers, parents, and friends. But in case it does not seem to exist naturally among the pupils, teachers should give not a little concern to the matter of developing the questioning attitude on the part of pupils. Given that, pupils are certain to learn.

The suggestions given below should be of service in stimulating and handling questions by members of the class:

1. Treat with interest and consideration all sincere questions by any member of the class.
2. Gauge the importance of considering the student's question, and the amount of time that can be legitimately given to it, by:
 - a. The importance of the question itself.

- b. The percentage of the class that will profit by the discussion of the question.
3. In refusing to answer questions which are irrelevant, and the consideration of which does not seem advisable at the time, care should be taken to be courteous and tactful, though brief. Even in the face of trifling or thoughtless questions the lesson is not lost.
4. Do not answer all questions. Stimulate the questioner to some effort on his own behalf, but do not carry this procedure too far. Often refer questions to others in the class, though avoid doing so in a manner which will reflect on the questioner.
5. Occasionally refer the questioner to references, but give due consideration to the possibility that the questioner will forget to consult them.
6. Pupils may be asked, as an exercise, to formulate questions to be asked in class, but remember that this device may easily degenerate into a formality, and the compulsory element of the situation may defeat the purpose of it. Where spontaneous questioning already exists, it should not be used.
7. In those situations where pupils question authority, patience must be exercised. While using the time of a large class to teach one individual is not to be recommended, students should nevertheless be dealt with on the basis of reason and logic.
8. In those situations where opinions differ the student should not be denied the privilege of his own opinion, and, even if he is apparently wrong, care should be taken not to antagonize or discourage him unduly by "strong-arm" methods.

A question which puzzles beginning teachers is what to do when asked a question the answer to which the instructor does not know. Distinction must be drawn between questions the answers to which the instructor should know, and those which lie somewhat out of his immediate field or those for which the instructor could not reasonably be held responsible. Instances in which the instructor is unable to answer questions covering essentials, or important details of the work at hand, or outstanding points in that field of

knowledge, should rarely occur. If the previous training has been somewhat incomplete, or partially forgotten, very careful daily preparation should regularly be made. Whenever the instructor is unable to answer with confidence, one of two procedures should be followed: (1) he should ignore the question if it be insincere or irrelevant; or (2) he should assign the point for investigation. In some cases he may do well to state frankly that he does not know with certainty, but that he will find the facts in the case and tell the class later.

Upon no occasion is it advisable to "bluff" with a mere guess. The loss of respect on the part of pupils and parents is much more serious when from this source than where the question is properly faced and investigated, or reported on later. The question may be raised again, and frequently is, this time by a pupil with the correct answer. The humiliation of discovered deceit is more painful and much more reprehensible than the humiliation of ignorance.

It is unwise to permit such a situation to be confusing or irritating. No one knows everything, and a student attitude may characterize teacher and pupil alike. Such a question asked should then be taken as in the natural course of events, and no attention be attracted to it. It is not undesirable to have pupils break the monotony by being able to contribute something to the development of the subject which is not already known by the teacher — assuming, of course, that it does not involve a defect in scholarship on his part.

Socratic questioning. Use of the method of questioning named after Socrates, the Greek philosopher, because of its resemblance to his method of teaching by leading people to think through to the desired conclusion, as opposed to direct exposition, is sometimes a valuable means for compelling a student to do his own thinking. Like other developmental

devices, though, it is time-consuming and cannot be used constantly.

The method is simply the procedure of asking such questions as will cause the pupil to think, in succession, the thoughts which will lead to the conclusion desired, or lead the pupil to see the absurdity of a conclusion already arrived at by him. Below is a brief example of the latter use of the method, taken from the field of algebra:

Teacher: "What is the meaning of x^0 ?"

Pupil: "It means x taken as a factor zero times."

Teacher: "How much is that, John?"

John: "Zero."

Teacher: "Let's see, John. Take this one: When we divide one expression by another, what do we do to exponents which are letters or numbers?"

John: "We subtract."

Teacher: "Then, if we divide x^3 by x^2 , what do we have for the quotient?"

John: "Just x ."

Teacher: "Suppose you divide x^3 by x^3 ?"

John: "That would be just 1. Anything goes into itself once."

Teacher: "Yes, that's true; but how about the exponent? x^3 divided by x^3 gives x to what power?"

John: " x^0 , I guess."

Teacher: "Then, what is x^0 equivalent to, John?"

2. Lesson-assignment procedures

Need for effective assignments. It is probably natural that teachers should unduly emphasize the work of the class period in which the teacher plays a predominating part, and that they should fail to recognize in practice, whatever they may believe as a matter of theory, the importance of pupil activity. Emphasis so placed, though, is very likely misplaced. Much more importance should be attached, and is being attached by recent students of educational method, to the "out-of-recitation" activities of the learner and less to

the actual recitation work. This is evident in the Dalton plan, the use of the problem and the project methods, the supervised-study movement, and other new tendencies in teaching, which we shall consider in detail in later chapters. Much can be said to justify this shifting of emphasis. The following considerations contribute to strengthen the case for it:

1. Much waste results from class recitation methods; because it is extremely difficult to keep all, or even practically all pupils busily engaged with concentrated attention on the work of the period.

2. The recitation type of work suffers from the difficulty of adjusting work to pupils of varying capacities and interests.

3. A function of the school, too important to be ignored, is that of training pupils for independent study. The school should aim, while not permitting the "learning" of the course of study materially to suffer, gradually to make teachers and recitations unnecessary, so that the work of education may go on after the pupil has severed his connection with the school.

The nature, amount, and effectiveness of the extra-recitation activities of pupils depend to a very considerable extent upon the nature and quality of the assignment. The fact that a large percentage of the pupils come to class with lessons inadequately prepared or not prepared at all, is due, among other things, to such facts as: that the assigned work has not challenged them; that it was not interesting; that they did not know definitely what was expected; that they did not know what to look for or what to emphasize; that they had not been given adequate explanations and instructions; that the assignment has not been adjusted to individual interest or capacities; and that the tasks set were so indefinite that the possibility of definitely checking up on them in the recitation was not great.

Causes for such defective procedures. Most new teachers begin by making hasty or ill-planned assignments. This

they do with a good conscience, because they feel that the assignments they are making are similar to those made by experienced teachers. This assumption is correct, if the average experienced teacher is taken as a criterion. With the large majority of teachers in this country, the assignment is a weak spot in their teaching procedure. While the American teacher excels teachers in other countries in a number of ways, such as the use of visual material and provision for the exercise of initiative, originality, and personality, he suffers, compared with teachers of the leading European nations, in the matter of making effective assignments. Betts, in his book on *The Recitation* (page 109), points out that "no class of German children are ever sent to their seats with the simple direction to take so many pages in advance. Teacher and class go over the next lesson, the teacher calling the attention of the class to the points of the lesson, asking them to hunt out subdivisions, etc., and instructing them how to prepare the lesson."

The factors contributing to the lack of effectiveness which has characterized the making of assignments in this country are rather easily identified. They may be enumerated, as follows:

1. Lack of sufficient time in which to make a good assignment, resulting from the extraordinarily heavy teaching load which secondary school teachers in the United States are required to carry. If extra duties, such as the coaching or supervising of student activities, overseeing study halls, and administrative assignments are counted in, the teaching load here averages close to thirty hours a week, compared with somewhere near twenty hours usually assigned the teacher in the German Gymnasium and the French Lycée.

2. The lack of a well-developed technique for assignments, due to the short professional life of the American high school teacher, and the large number of novices; to the com-

paratively short period of time that high school teachers have been given professional and technical training in the higher institutions; to the misplaced emphasis upon teaching and testing, rather than upon learning; and to the rather general lack of understanding as to the best methods of study and work.

Teachers who would be truly successful must break the hold of traditional practice and, in spite of heavy teaching loads, find time to plan for and to make adequate lesson assignments. Perhaps the time to prepare assignments may have to be squeezed out of the time given to marking the written work of the pupils. The time needed for good lesson assignments may be spared to advantage from that devoted to recitation work. The better the assignment, the better prepared the class will be to do the outside work, the better it will be done, and the less will be the time needed for repetition and explanation in class. Improved pupil-study procedures will enable teachers to carry on the recitation within its proper bounds. The time is rapidly approaching when the teacher who is not apt at stimulating and guiding pupils in their studying will not be sought after. Already supervisors and principals are likely to judge this ability by the type of lesson assignments the teacher makes.

Essentials of an effective assignment. Assigned work consists of activities which constitute experience believed to be of service in attaining educational aims and ends. Assigned work should always be so regarded. When reading material, in textbooks or elsewhere, written work, exercises, problems, compositions, observations, memorization, or practice is assigned, it is or should be with the thought that the activities of the student involved in the task assigned will result in or contribute toward the acquisition of desired information, habits, skills, attitudes, ideals, and interests. The fundamental aim of the assignment is to

stimulate pupil activity which will result in educative experience, by which students make progress toward the aims of the subject taught. The true criterion by which assignments should be judged is the extent to which the student performance resulting from the assignment contributes to the purposes of instruction, as compared with the time spent in the assigned activities.

There are three important factors conditioning the effectiveness of any given assignment: first, the degree to which the assigned activities, if adequately carried on, will contribute to the desired improvement of the pupils; second, the degree to which the assignment is adjusted to the powers of the pupil; and third, the degree to which the proposed activities are certain to be carried on by the pupils, or, in other words, the degree to which the assigned work engages the attention and interest of the pupils.

With the above considerations in mind, we distinguish five direct functions of assignments:

1. To connect the new work with that just completed, and to introduce the new work.
2. To give a clear idea of what is to be done, and the standards by which the work of the pupil is to be judged.
3. To give the pupils that amount of assistance, direction, explanation, and suggestion which will enable them to spend their time most profitably.
4. To arouse in the pupil a favorable attitude toward attacking the work assigned.
5. To regulate the daily work so that the tasks assigned are adjusted to the time, ability, and opportunity of the students to do them.

Criteria of effective assignment procedure. There are five important criteria to be kept in mind by the teacher in making assignments. These are:

1. *The assignment should introduce the new work.* Ordi-

narly it is wise to introduce new work by showing how it fits into the work of the course, or its relationship to the work just completed, and also by going over the lesson with the class in such a way as to give them a bird's-eye view or general idea of the material, and what it is intended to teach. Getting such a view gives the pupil such a start toward the work assigned as should operate to incite interest, and to give him a framework into which he can weave the lesson as he proceeds to its detail.

2. *The assignment should be definite.* Perhaps the most important quality of a good assignment, granting that the activities contribute to educational purposes, is *definiteness*. Tasks should be made definite. This may be done by giving study questions, or study problems and exercises. Young students should not be told to "study" lessons. They should be told to do definite things with lessons. They should be asked to react in definite ways. They should be given questions, exercises, and problems to solve, in the doing of which they employ the material of the lesson — allusions, comparisons, applications, analyses, cause-and-effect exercises, and similar material and problems. For types of good assignment questions, examine the Monroe-Carter list of question-types given in an earlier section of this chapter.

Standards by which the pupil may judge his preparation should be given, whenever possible. Such statements as "Be able to give three causes of . . ."; "Be able to go to the board and write out a summary of . . ."; and "Be able to say from memory the first three stanzas of . . ." are exercises contributing to definiteness in assignments.

By making assignments definite, in such a manner, the efforts of the pupil may be controlled and directed into those activities which contribute most thoroughly to the purpose of the material studied. He is guided by the questions and

problems to the points that deserve emphasis, and to the activities of most value. Good technique in this respect tends to prevent the waste resulting from a promiscuous and impartial scattering of attention and effort over all the lesson-content, regardless of relative values. Where the pupils attack tasks with a definite goal in view, the attention is keener, and on a more effective level, than where the goal is merely a general familiarity with material covered.

Not only should assignments be made quite definite, but the teacher should ascertain whether the students understand definitely what has been assigned. Assignments should be made slowly and with care, and at a time when they can be made deliberately. A device used quite generally is the assignment notebook. Into this notebook assignments are carefully copied at the time they are made. This prevents the waste which results from forgetting instructions, suggestions, and assignment problems and questions.

Many teachers find it worth while to check up on an assignment just made by asking a pupil or two to state it as they understand it.

3. *The assignment should prepare the student to carry on the activities effectively.* In all the better texts in foreign languages, and in many of the school editions of English and American literature, will be found notes and suggestions. These are calculated to assist the pupils in those difficulties upon which the typical student would otherwise spend an amount of time out of proportion to the educational value received. The service, however, is not usually performed for the student of history, social science, or natural science, and very meagerly for the student of mathematics; the responsibility with these subjects falls upon the teacher. Difficult passages upon which the student might spend an undue amount of time should be explained, and places most

likely to result in error should be pointed out. Directions and suggestions on the best methods of procedure should be given. New methods and processes need to be developed or explained.

To perform this type of service will require much teaching skill and judgment. The teacher must be able to steer a judicious path between leaving the pupil so ill prepared to do his work that blundering, waste of time and effort, and discouragement result on the one hand, and giving him so much assistance that little is left which really challenges his efforts on the other.

Colvin insists that "the chief function of the assignment is to teach the pupil 'how to study.'" It is certain that the assignment should contribute materially to training pupils in this art. Teachers of history need to show their pupils how to get at the significant things in books on history, and how to outline or take notes as they study. They need to train their pupils in the organization and use of the materials of history, and to show them how to use maps and references. Teachers of foreign languages, similarly, need to show pupils how to acquire vocabulary, declensions, and conjugations, and how to translate most economically. This topic will be discussed more fully further on, in the chapter on supervised study.

4. *The assignment should appeal to some interest or incentive which will stimulate the desired activity.* The student must not only know what to do, and how to do it, but he must also have some interest in it or incentive to do it. If the assignment possesses definiteness, a big step toward success in student response has been made. Students prefer tasks with definite goals and definite standards. Burton mentions a youngster who once said to his parents, "I like school this year; Miss A. gives us so many things to do. Last year Miss M. just said, 'Open your books and go

to work.'” While this little chap was only a fourth-grader, his older brothers and sisters in the high school are not unlike him in this respect. The writer has asked the members of a score or more of his classes to think back to their high school days and recall what subjects they prepared most regularly and most completely. In every instance mathematics and foreign languages rank first and second, with some other study a very poor third. When those who designated mathematics or foreign languages were asked if these subjects were the subjects which they liked best as subjects, the majority responded decidedly in the negative. The reason for the regular study of mathematics lies in the definiteness of the tasks assigned. These subjects, by their very nature, are definite. Pupils do not just study “algebra.” Their work consists very largely in the solution of definite problems and exercises. The satisfaction which comes from successful completion of these tasks operates to invite effort. The tasks are engaging because of their definiteness.

Instead of recognizing the value of definiteness in assignments as pupil incentives to work, many teachers place their major reliance on threats and promises, direct and implied. Pupils prepare lessons to avoid unpleasantness in the way of being “bawled out,” receiving low grades, being put on ineligible lists, or failing in subjects or grades; or, to put it in a positive way, to receive praise, satisfactory grades, full credit for their subject, or promotion to the next grade. Mixed with this is a mild feeling, that “I will need this some day.” It is quite unlikely, though, that the incentive of future need is of much consequence in motivating daily assignments in French grammar, history, algebra, or other subjects. The need is too far deferred; the study gives too little immediate satisfaction. The most effective force in getting school work well done is immediate interest, resulting from the satisfaction that the learning activity gives to

instinctive and acquired desires. Prominent among these are the desire to achieve definite and concrete units and tasks; the desire to satisfy curiosity; the desire for expression-construction, and communication; and the desire to excel. Activities which give satisfaction to these desires, without involving corresponding annoyances, such as discouraging perplexity as to goal, as to procedure, or physical discomfort or ennui, are "preferred activities." They are what Thorndike calls "satisfiers." In so far as it is possible, school tasks should be selected or planned so as to be "satisfiers." They should never be "annoyers" if this may be prevented.

As an example of the appeal to curiosity, Bagley tells of a teacher who, when approaching the study of Benedict Arnold and his treason, assigned the lesson somewhat as follows: "The next few pages of the book tell about a very mean man. I do not think I have ever heard of another man so mean and contemptible as he was, . . . but after all it was rather a pathetic case, and you might read it over this evening."

Where the situation is appropriate, interest may be obtained by employing contests of some sort. Interest is keener and more easily obtained if students feel that what they prepare is to have intrinsic value, or is to be used for some direct purpose. Examples of prepared work of worth are: the writing of news for a paper or letters to be sent, the making of a battery or a radio, the preparation of food, the keeping of actual books, or mathematical calculations which are needed for practical purposes by some one.

The coöperative assignment is more likely to appeal than the arbitrary assignment. Where the assignment grows out of discussion, and when the pupils plan and decide upon the tasks to be assigned, it is more certain to be understood as to purpose and to be of interest. The very planning of it

arouses discussion and interest. On the other hand, the possibility of failure of pupils to agree, and the time required for developing the coöperative assignment, tend to reduce its net advantages.

5. *The assignment must be adjusted to the time, ability, and opportunities of the class.* Just how much time is required by the average student to complete a proposed assignment can be judged accurately only by teachers of some experience and some gift of imagination. Some serious consideration should be given to the matter of adjusting assignments to the time required, by the class concerned, for their successful completion. The length of the recitation period, the number and length of study-hall periods, the absence or presence of intense outside interests, the nature of the work assigned, the preparation and maturity of the students — all these must enter into judging the “length” of assignments. On the whole, the amount of time required for all the activities of any one full-credit subject should average in the neighborhood of one hundred minutes daily. Four such subjects would aggregate six hours and forty minutes, which, with extra-curricular activities, would approximate eight hours of school work. For the slow student more time would be required.

It should be made certain that reference books are obtainable in sufficient number before assignments to such are made. Often disappointment and irritation, on the part of both teacher and pupil, may be averted by a little advance investigation.

As far as possible assignments should be adapted to individual differences of ability. Some plan of special individual assignments, flexible assignments, or differentiated assignments should be employed in most classes. A detailed discussion of provisions for individual differences in the assignment will be found in a later chapter, and

further consideration of this point is deferred until we reach that point in our study.

Time for making assignments. No general rule may be laid down as to the best time in the class period for making assignments. Assignments made at the close of the hour are quite often hurried, inadequate, and poorly attended to by the pupils because of the tendency to fail to set aside sufficient time for that purpose. The tendency is so general that it is sometimes advised that the assignment should always be made at the beginning of the period, when sufficient time may be taken and when the attention of the pupils is more favorable.

It seems, however, that the assignment should ordinarily be an outgrowth of the recitation. It should "fit on" to the previous work. The assignment should carry the work on from the point at which it was left in the recitation, and it should include material chosen to bear on the problems which have arisen during the hour. The amount and nature of the work which may be safely assigned often depend upon the degree of mastery of the work of the previous assignment. If these considerations do not seem to apply, the first of the hour is no doubt a better time, but if they do apply the teacher should exert special effort to reserve sufficient time at the close of the hour for adequate assignment. Where the latter portion of the hour is used for supervised study, the assignment should in all instances follow the class recitation.

It may be possible to develop the assignment piecemeal in the recitation. As avenues leading to further investigation and progress appear, it may be wise to assign such work on the spot. If this plan is followed, there will be greater danger that all of the assignment is not generally understood, and it is often very advisable to restate the assignment at the close of the hour in the form of a summary. It is also

often advisable to restate, at the close of the hour and with modifications and additional comments, the assignment made at the beginning of the hour.

The question of daily *versus* longer assignments. There is without question a growing tendency to assign work in larger than daily units. Many teachers make weekly assignments. The Dalton plan, to which we refer more at length in a later chapter, as usually employed is based on monthly assignments. The use by teachers of projects, life-units, challenges, and problems, involving units ranging from a day or two to a semester in length is becoming more and more common.

There is much to be said for unifying and coördinating daily increments of work by employing longer assignments, yet where these are used, almost daily, supplementary instructions, modifications, and encouragement may be given to advantage. On the other hand, where daily assignments are contemplated there will be some days in some subjects on which the assigned work will be simply a continuation of work, or the same type of work as that of the day or the few days just before. For this reason it is not always necessary to make elaborate daily assignments. Teachers are, however, very much more inclined to assume that everything is understood than the actual situation justifies, and that nothing worth while is to be gained by elaborating the assignment.

Planning for assignments. In order that the teacher may make an effective assignment, it is necessary that the work of the assignment be quite carefully examined. The teacher must determine what the outstanding aim and the points to be emphasized are, and so plan the assignment that the activity required of the students will contribute toward the realization of the aim and bring the points of importance into prominence. The teacher must gain for himself a

bird's-eye view of the whole lesson, and an appreciation of its relation to other lessons and to the course. He must be on the lookout for difficulties that require suggestions or hints, and opportunities for problems, questions, or exercises. He must be on the lookout, too, for ways in which he may make the lesson appealing, and thus engaging of interest and effort.

3. The review procedure

Place of the review in teaching. The necessity for review exercises in the development of ideals, attitudes, and interests is difficult to evaluate. Perhaps ideals may be renewed, attitudes reinforced, and interests revived by review exercises, but more likely than not better progress could be made, in so far as these outcomes of teaching are concerned, by going on into new materials. On the other hand, when a body of information has just been considered, even though it consists of but few items, review in the way of summary is quite desirable and effective. Where acquisition of information is the goal, it is better to have reviews than to be satisfied with half-mastery. In training in skills and habits, even after drills have made the response automatic and accurate, it is necessary to go through them occasionally to offset the inroads of forgetting.

Reviews should not be considered as synonymous with drill, however similar in some instances the two learning activities are. The drill exercise is concerned with repetition, for the sake of rendering the response automatic and accurate. A review serves to assist in these ends, but it has distinctly different ends and aims. Nor are reviews to be considered as synonymous with tests, or as a type of test, though reviews may serve to test.

Purposes of the review. Reviewing may be differentiated from drill work, both by its distinctive purposes and its

distinctive points of procedure. The purposes of the review are not only to:

1. Provide for further repetition as a means of fixing facts or motor responses; and
2. Test the progress of the pupil in the subject-matter covered by the review;

but the review also has as a main purpose to:

3. Give the pupil a view of his subject from a distance — viewing it as a whole or as larger units;
4. Give the pupil an idea of the organization, emphasis, and relations of the subject-matter, and the relative importance of points or portions;
5. Reveal the weakness of the class or of individuals, as a basis for a few final touches of remedial teaching; and finally
6. Lay the basis for the approach to new subject-matter.

Keeping these purposes in mind, let us proceed to a consideration of review procedure.

Occasions for review. The traditional time for review has been just before quarterly and final examinations, and no doubt much can be said for a certain type of reviews at that time. Coming at the close of the work of the quarter, semester, or year, a review at that time is appropriate for the purposes of organization, summary, selection, diagnosis, and fixing of important points. The impending examinations serve as a spur or incentive. Reviews, though, should by no means be confined to these occasions. If time is available, reviews at the natural breaks in the subject-matter are recommended. At the close of a chapter or a series of chapters, a summary, an organization of material, and remedial work are excellent things, and in most instances are more productive than the same time and effort spent in going on to new material.

Reviews of even smaller units are almost necessary to mastery. Some teachers spend at least a part of Monday or

Friday in reviewing the work of the week. Some open each day's work with a review of that of the previous day. Others close each day's work with a summary. These are helpful, and when carried on systematically, and kept within proper bounds as to time, are sure to promote mastery.

A rather different type of occasion upon which review may advantageously be used is the situation where the ground may be best laid for the solution of new problems by the recall of previous material or experience, thus establishing a useful apperceptive mass or favorable frame of mind.

The review for the special purpose of diagnosis should be employed more than is commonly done. For this purpose written tests, carefully devised to sample the subject-matter and to bring into relief the types of difficulties or important items of information, are effective. In a later chapter we shall consider the type of review testing much more in detail. Remedial instruction, based upon the results of such tests, may also be said to be review work, but such "reviews" are somewhat different from the sense in which review is generally taken. Since the testing procedure is hardly review procedure, perhaps it is better termed remedial instruction.

Technique of the review lesson. The technique of the review varies with the occasion for the review. The review for recall of related ideas, as an apperceptive basis for new work, consists simply in getting before the pupils the material which is most likely to produce the desired memories or frame of mind. This may be done by questioning, by assigning readings, or by telling. Since the time available for this preparation is usually limited, the procedure must not be permitted to drag out. The daily review should be quite short, and should not be permitted to slow-down materially the advance work.

One form of the daily review is the cumulative review.

In the cumulative review the work is brought up to date each day by a few minutes given to a résumé of all the previous work of the chapter, main topic, or large unit of subject-matter. It is customary, where the cumulative review plan is used, to telescope the earlier material more and more from day to day, rather than to take more time for review. The daily review is usually given in the form of a lecture summary. It may be developed by questioning the pupils, but this usually requires more time than should properly be devoted to it.

The other type of review, the review coming at the end of a large unit of subject-matter, or at the end of the semester or year, is what we ordinarily think of as review. It is distinctive in type, and involves a somewhat different procedure from that used for original presentation. Particularly is the element of selection prominent here. A review of this sort should not contemplate a resurvey of all that has been covered in detail, but should select a few points on which the pupils are suspected of being weak, and ones which are considered as of outstanding importance for permanent retention, or as preparation for work to come. The reviews should then be confined to a resurvey of the portions selected, and the material reorganized around a small number of main heads, or problems. This will permit a view as a whole of the daily units of subject-matter which the student has studied one at a time at such a close range that he was unable "to see the forest for the trees."

The problem review. A professor of economics at the University of Missouri once wrote on the blackboard, as the sole question for a three-hour examination at the conclusion of an elementary course in economics, the following question: "Why do Mercantile cigars sell for ten cents?" This would have been an excellent review problem. To answer it required a summary of most of the chief points of the

course, as well as some skill in organization and application. Problems of this type might be used with advantage in the content subjects in the high school. For example, in American history the following review problems are frequently used: "Trace the argument of States' rights *versus* centralized control, from Colonial days to the time of the Civil War"; or, "How did the United States come to have the boundaries it has to-day?"

Among the types of questions most usable for the problem type of review are:

1. Questions involving comparisons, such as: "Compare the characteristics of the immigrant of the Seventies and Eighties with those of 1900 to 1915."
2. Cause-and-effect questions, such as: "Why has the Republican Party been successful in the majority of elections since 1860?"
3. Questions involving selective recall, such as: "What are the chief differences between the first and second conjugations?"
4. Questions which summarize activities, events, characteristics, factors, or results, such as: "Give a brief account of the Unification of Italy."
5. Questions involving analysis, such as: "What sort of man would you think the author is, judged from this book?"

The socialized review. There are numerous devices or forms of socialized reviews which serve to stimulate interest and activity. These will be considered more at length in a later chapter, and only a brief summary will be given here.

A common plan for using this type of review is to permit the students, in turn, to ask some question over the material covered and to designate some one to answer it. The student so designated then frames another question, and assigns it. This type of "review" emphasizes rote and piecemeal memory, rather than organization. For types of work where such outcomes are aimed at, as, let us say, the learning of dates in history or the mastery of rules, the device has the merit of provoking interest.

Another method is to assign certain sections of the material to various individuals or groups for summary, organization, and presentation to the class, with whatever devices can be thought of to assist memory, such as charts, diagrams, or other schemes.

Still another plan is the "Doctor's examination" type of review. Pupils are placed in turn at the instructor's desk at the front of the room. After a brief summary of the principal points of the topic or section of work assigned, each stands ready to answer any fair question put to him. A student chairman may conduct the examination.

Review quizzes. One of the difficulties mentioned by many teachers is that of stimulating any effort on the part of some of the pupils when review work is being done. These pupils trust to their grasp of the materials as gained in the original presentation. Types of socialized recitations operate to maintain interest, as do matches and contests. Another plan which is effective, and which also furnishes a check on the mastery of individuals, is that of starting off each day given to review work with a short written test. The test results in furnishing evidence from which individual diagnosis or class diagnosis may be made.

We have now considered three important phases of the teaching process — questioning, lesson assignments, and reviews — and the technique the teacher needs to master for the proper handling of each. With this much established as to the nature of the teaching process, we are ready to pass to the next topic — the planning of the instruction. This we shall consider in the chapter which follows.

QUESTIONS AND EXERCISES

1. Write out a list of ten criticisms of questioning, as it is sometimes done.
2. Rank the functions of questioning in the order of their importance. Which functions are more neglected in present-day practice?

3. Write out a question to illustrate each of fifteen of the different types of thought questions, as suggested by Monroe and Carter.
4. Think of two suggestions on the technique of questioning, in addition to those given in the paragraph headed "Procedure in questioning."
5. What are the advantages and shortcomings of Socratic questioning, as you see them?
6. Give several examples showing how the principle of adjusting approval or criticism to the pupil may be worked out.
7. What, in your mind, is the real reason why assignments are not made more effectively than they are?
8. What subject did you prepare for most thoroughly when you were a student in high school? Why?
9. What are the relative points of strength and weakness in the use of longer units in assignments, as weekly, or monthly assignments (as in the Dalton plan), or in projects or longer problems?
10. Under what circumstances is it permissible to make no assignment in a given class period? What are the dangers in so doing?
11. Write out, in some detail, what you consider to be a good assignment for
 - a. This chapter;
 - b. Some part of a high school subject.
 Show in what ways each meets the requirements of a good assignment.
12. Think out the plan or schedule you would most likely follow in providing for review work.
13. Write out a description of how you would conduct review lessons, given just before final examinations.

SELECTED REFERENCES

- Betts, Geo. H. *The Recitation*. Boston: Houghton Mifflin Co., 1910.
Pp. 33-40, 55-77, questioning; pp. 107-18, assignments.
- Burton, Wm. H. *The Supervision and Improvement of Teaching*. New York: D. Appleton & Co., 1923.
Pp. 176-86, assignments.
- Charters, W. W. *Methods of Teaching*. Chicago: Rowe, Peterson & Co., 1912.
Pp. 296-312, questioning; pp. 396-413, assignments; pp. 355-63, review.
- Colvin, Stephen S. *An Introduction to High School Technique*. New York: The Macmillan Co., 1917.
Pp. 310-33, questioning; pp. 236-43, assignments.
- Davis, Sheldon Emmor. *The Work of the Teacher*. New York: The Macmillan Co., 1918.
Pp. 183-92, questioning; pp. 139-53, assignments.

Foster, Herbert E. *Principles of Teaching in Secondary Education*. New York: Charles Scribner's Sons, 1921.

Pp. 55-73, questioning; pp. 201-04, assignments; pp. 255-58, review.

Handschin, Chas. H. *Teaching of Modern Languages*. Yonkers, New York: The World Book Co., 1924.

Pp. 286-92, review.

Holley, Charles E. *The Teacher's Technique*. New York: The Century Co., 1922.

Pp. 182-91, review.

Minor, Ruby. *Principles of Teaching Practically Applied*. Boston: Houghton Mifflin Co., 1924.

Pp. 176-90, review.

Nutt, Hubert Wilbur. *Principles of Teaching High School Pupils*. New York: The Century Co., 1922.

Pp. 238-47, questioning.

Parker, Samuel C. *Methods of Teaching in High School*. New York: Ginn & Co., 1915.

Pp. 465-74, questioning.

Stormzand, Martin J. *Progressive Methods of Teaching*. Boston: Houghton Mifflin Co., 1924.

Pp. 262-68, questioning; pp. 218-25, review.

Strayer, George D. *A Brief Course in the Teaching Process*. New York: The Macmillan Co., 1911.

Pp. 114-23, questioning; pp. 101-64, review.

Twiss, George R. *Teaching of Science*. New York: The Macmillan Co., 1912.

Pp. 60-61, questioning; pp. 149-56, review.

Waples, Douglass. *Procedure in High School Teaching*. New York: The Macmillan Co., 1924.

Pp. 103-17, questioning; pp. 149-62, assignments; pp. 304-11, review

CHAPTER III

PLANNING THE INSTRUCTION

1. *Planning the work of the course:* The desirability of planning — Necessity of keeping aims in view — Aims in terms of child development rather than in terms of subject-matter — Aim of the special subjects — Laying out the course.
2. *The daily planning:* Daily lesson aims — Sample daily lesson aims — Pupil lesson aims — Characteristics of serviceable aims — Content and procedure — Planning the assignment — Writing out lesson plans — Forms and examples of lesson plans — Using the daily lesson plan — Lesson-planning in varying types of procedure.
Questions and exercises — Selected references.

1. *Planning the work of the course*

The desirability of planning. There are two types of planning for teaching that should not be neglected by either the beginner or the experienced, successful teacher, namely, planning the course of instruction as a whole, and planning the daily work. There are many teachers, to be sure, who manage to do a passable grade of teaching by giving a minimum amount of thought and time to lesson planning. They maintain a type of discipline and a quality of lesson-hearing which does not offend the casual observer, the mediocre character of which is not particularly conspicuous because of the large number of such teachers. For the most part such teachers are novices and transients. While here and there will be found a teacher who, by reason of an unusual gift of personality and native teaching genius, accomplishes superior results with a minimum amount of lesson planning, supervisors of teachers in training, whose daily work calls them into many classrooms of teachers, agree that the chances of teaching success for any given teacher are

definitely and materially increased if the habit of careful planning of the teaching has been formed. Careful planning often compensates for the lack of natural qualities of personality and mind and a lack of superior scholarship to such an extent that teachers only ordinary in these respects are nevertheless able to produce results above the ordinary.

Indispensable as these activities are for the experienced teacher, if his work is to be of a distinctly superior type, they are absolutely prerequisite to really successful teaching by beginning teachers. Older teachers, who have planned their courses and their daily work over a period of years, may, to a certain extent, safely rely upon previous lesson planning. Without question, though, to continue to rely for long upon the planning done in earlier years leads directly to stagnation and professional hardening of the arteries. Unfortunately for the teacher, such deterioration gives no warning. The beginning teacher, however, must either "plan" or rely upon impromptu methods, and these, with beginning teachers, are almost certain to be mediocre or inferior in quality. Much of the attention of the beginning teacher is absorbed in those problems of discipline and management which lessen in importance with experience. After a teacher has given his courses a number of times he will be less dependent in the matter of his grasp of the subject-matter of the course, and he will attain a poise and feeling of confidence, a deliberateness, which will enable him to do clear thinking before the class. He will have gained proficiency in the details of discipline and class management, and will have cultivated a manner which will operate to keep these problems at a minimum. When this stage is reached, there is some possibility that fairly effective teaching methods may be planned in the classroom, impromptu fashion as the work proceeds, but until this level of

efficiency has been attained the chances of such impromptu planning being very successful are slight.

If, for the first year or so, beginning teachers might teach only two or three classes, the load being increased gradually during the first four or five years, time for careful and methodical planning would be available. This free time might be spent partly in observation of master teachers. As it is, though, the novice begins work with a full assignment, and as a result the planning for the first year often is inadequately done. After a year or so of such teaching this inadequate teaching routine becomes a matter of habit, the teacher becomes satisfied with low standards, and only the exceptional teacher ever gets out of the rut. The beginning teacher who is ambitious must work overtime, during the first few years of his teaching, if this phase of his work is to be developed as it should.

Necessity of keeping aims in view. Teachers who expect to succeed in a large way must be able to see their tasks in the large and in proper perspective. They must also acquire a grasp of and keep in mind the aims and purposes of secondary education, and the particular subject being taught, with its educational possibilities and the contribution to education which it is supposed to make. Such practical and common-sense considerations should guide in the selection and arrangement of and emphasis on given subject-matter, the standards of proficiency to be insisted upon, and the methods to be used in daily instruction.

Yet not all teachers, or perhaps even a majority of teachers do these things regularly and thoroughly. Beginning teachers are for this reason misled, because they do not find older teachers working in such a fashion. Because this condition exists, methods and material tend to become independent of aims, adequate results are not obtained, school teachers are regarded as impractical and bookish, and

quite frequently in the same spirit the values of education and study are discounted.

Aims in terms of child development rather than in terms of subject-matter. The absurd situation in which we have been discovering ourselves as teachers, namely, as purveyors of subject-matter instead of guides to child development, accounts in part for the failure to keep proper objectives in view. Teachers have fallen largely into the error of regarding their task as the traversing of certain traditional units of subject-matter, rather than as the task of guiding and promoting the development of boys and girls along desired lines. Because the process of development is long continued, and is accomplished only through daily use of small items of subject-matter, it has been easy to concentrate upon these daily tasks to such an extent that perspective is lost, and the purposes for which the daily tasks are done slip out of the focus of attention. For the same reason aims in terms of the development of boys and girls tend to be obscured by aims of "covering" the subject-matter. In other words, teachers are by the very nature of things quite exposed to the danger of being so close to the daily work that they do not "see the forest for the trees," and the means used obscure and supplant the ends desired.

The teacher in planning the course, or the work of the day or the week, should remember that the function of the school is to so select and control the environment of the pupils, that the modification of the individuals and the control of their conduct, effected through the medium of the habits, skills, attitudes, and ideals built up, will be such as to contribute most heavily to the well-being of themselves and the society of which they are a part. School education, then, is the bringing of the individual, by means of the content school subjects, activities, and teachers, into such contacts with experience as will result in the desired changes.

It is only reasonable that we should exercise an intelligent and economical procedure in selecting and arranging the subject-matter and methods which will furnish such experience as will produce the changes society desires.

Aim of the special subjects. It is not only desirable that the classroom teacher be conscious of the aim and functions of secondary education, as a whole, but that he be familiar as well with the peculiar functions and possible educational values of the subject he is teaching. Every subject taught in the school possesses certain values for vocational, health, cultural, civic, domestic, or moral education. In what ways the subject may be made to contribute to efficiency in these respects should be known by the teacher. For example, if it is agreed by the "best minds" that the chief purposes of the teaching of literature are to form wholesome ideals and attitudes, to develop interest in good literature, and to convey valuable ideas in appropriate form, literature should be taught to those ends, and materials and methods should be so selected and marshaled that the ends may be realized. If, on the other hand, the aims of teaching literature are conceived of as the development of the power of literary analysis and criticism, the development of literary style, and the giving of familiarity with the development of English literature from the time of Chaucer onward, somewhat different materials and methods should be employed. What is more, no matter what aims are selected, none will be achieved in large measure unless they are focused upon and the material made to yield training in that direction. The mere traversal of content cannot be relied upon to produce of necessity any given educational outcomes.

It is the duty of every high school teacher, early in his teaching career, to determine what are the purposes of the subjects which he is teaching. He should read what the leading authorities in the field have written in that connec-

tion, as in books on the teaching of history, or of mathematics, or whatever the subject may be, or, better still, one of the recent reports of committees of experts which have considered the purpose and place of the subject in secondary education. Among the most valuable of the latter are the series of reports of the various committees of the Commission on the Reorganization of Secondary Education, which have been published by the United States Bureau of Education, at Washington, D.C., and may be had for only a nominal sum. These are listed in the references given at the close of this chapter.

Laying out the course. At the outset, then, the teacher should first lay out the work of his courses for the whole semester, or for the year. This enables the teacher to view the undertaking as a unit. Most college teachers prepare in advance an outline or syllabus of each course. Procedure of this sort is time well spent. Every instructor should have in mind a bird's-eye view of any course he is to give. At any point in the course he needs to know what material is coming later in the course, and how and when it is coming in.

In the elementary schools it is considered good policy for each teacher to be familiar with the work of the preceding grade or two, and with the work of the grade or two which immediately follows. The elementary school teacher then sees her work as a part of the development of a whole subject, has some idea of what her pupils have had, and also what she should prepare her charges to undertake in the next grade. Such knowledge possessed by the high school teacher should influence his teaching by dictating relative emphasis to be placed upon different divisions of the course, and the methods of teaching to be used. The teacher of American history, for example, who has mapped out the work of the year may so teach and note and emphasize phases of the work, in earlier parts of the course, as will be

quite useful in developing the work to be taught later on. For example, the early settlement of the colonies in America, and the differing natures of the different groups of colonials, together throw much light upon the stand taken by the people of these sections on political, educational, and economic problems in later times. Again, the early beginning of attitudes toward national governments may be noted in the colonial governments. The beginning of the slavery question, the tariff question, and the question of strong local *versus* highly centralized government have their beginnings in incidents of colonial and early national life, which in themselves may seem insignificant at the time they are being studied. Similarly, just what facts and skills, developed in the early portions of foreign-language and mathematics instruction, will be most needed later on, and what level of proficiency in them is desirable, depends upon the nature of the work of later portions of the course. The same may be said of all other subjects.

In planning the work of the course as a whole, then, care should be taken to consider what materials will be needed during the entire term. The library may need supplementation, or, in case this is impossible, it may be wise to adapt the course to the reference books which are available. Laboratory and shop equipment must be considered in a like manner. It is an excellent procedure to think through a large unit of subject-matter and list the visual material desired, so that it may be arranged for in advance. So doing will prevent that neglect which so often results when this is not done.

A feasible plan for laying out the work of the course consists of the following steps:

1. Before beginning the instruction, make a survey of the course for the semester or the year, and reduce the work to an outline on the basis of four- or six-weeks periods.
2. Then make a more detailed outline of each smaller unit of the

course, as for two or three related chapters, or the work of a few weeks. The instructor should aim to keep a few weeks or a month ahead with these outlines, beyond the work being covered in class.

3. Each week make a schedule for the following week, noting briefly the breaking-up of the work of the week into daily units.

Where teaching units are to be used which extend over more than a few days, these must be considered under steps 1 and 2. This applies particularly to such methods as the use of projects, or large problems.

2. The daily planning

The teacher who would plan his work carefully should keep before him four major tasks in planning:

1. He should get clearly in mind as an objective, and as a criterion for the selection and emphasis of materials and the planning of method, the aim of each day's work.
2. He should familiarize himself with the content of the lesson for the day.
3. He should plan what he considers the most effective procedure.
4. He should plan most carefully what instructions or assignments he will give for future work.

Daily lesson aims. If teaching is to be most effective, all materials and procedure must be planned according to the aim sought. All subject-matter worthy of teaching has some special purpose or function; it has some contribution to make to the purposes of the subject taught. The teacher should determine for himself what this contribution is. He should determine what skills, habits, ideals, interests, attitudes, or information should be selected as goals for the work. In other words, he ought to settle for himself what the "big idea" of the day is to be, and then select, arrange, and teach the materials so that this aim may be most

fully realized. This is not "theoretical" or "ideal"; it is just plain matter-of-fact common sense. The impractical theorist is one who teaches the material as he comes to it, impartially and without goal or perspective, and with a peaceful but unreasoned faith in the efficacy of the procedure.

It should be obvious that the lesson aim should be clearly in mind before the assignment is made, and the materials assigned should be selected and organized according to the lesson aim. While this is usually partly taken care of by the textbook, additional material and better organization usually may be planned. The helps, hints, and suggestions given the class should be considered with this aim in view, as should the emphasis laid upon the various portions of the assigned work or the problems involved in it. The nature, scope, and amount of assigned exercises, and the problems, questions, or other activity should be determined in view of the lesson aim, as should the standards set determine the degree of mastery that is expected of the students.

Sample daily lesson aims. By way of illustration, we give a few examples of the aims taken from the plans of teachers who attempted to get in mind what they were trying to accomplish in the day's work before outlining their teaching procedure.

United States History — That the class may understand something of the social and economic conditions of the people in the country, and what effect these conditions had on settlement in the New World.

General Science — To acquaint students with a few rudimentary facts concerning the kinds, sources of, and the control of electricity.

Commercial Geography — To show that the mining of gold and silver in the United States helped to bring people here and develop our country.

English — To teach the students how to write an interesting letter of friendship.

Plane Geometry — To give the pupil a second method for locating a circle, and a test for equal chords and equal distances.

French — To introduce the pupils to Coppée as to his style, fame, and merit. To interest them in *Le Luthier de Crémone* as a fascinating little play worthy of their careful attention, and to prepare them for an æsthetic appreciation of the musical quality in Coppée's lyric style.

Spanish — To test the pupils' knowledge of the uses of the tenses of the indicative mood, and the imperative.

United States History — That the pupils should understand why the Government was weak under the Articles of Confederation, and the purpose of the Constitutional Convention.

English — To teach the types of paragraphs, and the essential qualities of each.

Algebra — To develop accuracy in the division of fractions by the cancellation method, stressing factoring of terms.

United States History — To bring the students to understand the religious and governmental conditions under which Maryland, Pennsylvania, Delaware, Georgia, and the Carolinas were settled.

Pupil lesson aims. Many teachers, in planning lessons, provide for two types of aims — the teacher's and the pupil's. In many instances these may be the same, as, for example: "The aim of this lesson is to present the properties and uses of chlorine gas, and methods of its preparation," but the pupil's aim also quite naturally is to learn the properties of chlorine gas and the methods of preparation of it. However, as was pointed out in the discussion of assignments, the aims of the pupil should ordinarily be in terms of definite tasks, which, if accomplished, will result effectively in the attainment of the lesson aim. While it is usually of value to have the pupil see and appreciate the lesson aim, it often is difficult, by so doing, to arouse sufficient eagerness in him to insure adequate activity on his part unless accompanied also by definite lesson goals which are formulated, in addition to the lesson aim, as a part of the assignment.

Characteristics of serviceable aims. Getting a good, serviceable lesson aim in mind is not an easy task for either the beginning teacher or the superficial teacher. Certain considerations in formulating lesson aims should be kept in mind; these may be stated, as follows:

1. Lesson aims should be definite. They should not be general or vague, such as: "To review the work of the week," or "To study the cray-fish," or "To give an introduction to the study of poetry."
2. They should apply especially to the lesson in question. Lesson aims which carry over from day to day are not as serviceable as those which are peculiar to the special day's work. Examples of aims that are too extensive are: "To develop fluency in speaking French," and "To develop appreciation of Wordsworth."
3. Lesson aims should be attainable, or such that a worth-while contribution toward their attainment can reasonably be expected from the work of the day. Examples of impractical or unattainable aims are: "To develop the memory," "To develop in a pupil a concept of the unity of science," or "To awaken a concept of the good."
4. Methods of procedure should not be substituted for lesson-aims, such as: "To apply the law of exponents," when "To develop proficiency in applying the law of exponents" is what is aimed at; or "To encourage a discussion of the character of Poe," when "To lead the pupil to a knowledge of certain characteristics of Poe" is meant.
5. While aims should be definite, they should not be too detailed, or be scattered over a number of sub-aims, as was the following assignment:

"The aim of this lesson is to discuss the cause of Edward's peaceful reign; the relations between Normandy and England during the reign; the activities of the rival claimants to his throne after his death; Harold's struggle to maintain the kingdom; William's methods that led to his complete conquest of England; and finally to summarize the two great conquests of the tenth century and to show the importance of each."

While it is desirable that the teacher envisage a definite aim or a big idea for each day's work, it is equally or more im-

portant that he does not lose sight of the big aim of the entire subject, or of the larger units of work.

6. It goes without saying that the teacher should give some serious thought to what are the aims for which the larger units of subject-matter are taught. Because the subject-matter has been carefully selected for the teacher through the medium of the course of study, or the textbook, or both, he is not likely to be conscious, until after having given some thought to the matter, of the aims or purposes underlying its selection. While it is desirable that the teacher should focus upon a few definite and specific aims for the day's work, it is not to be suggested that he lose sight of the general aims of the larger units of the subject which should always be kept in mind.

Content and procedure. The teacher then should familiarize himself thoroughly with the material to be taught. A serviceable method is to outline the subject or course. This assists also to bring out clearly an organization of the content. The outline may also be used, in case of need, to refer to in class to refresh the memory of facts. The content outline should contain all the main facts, principles, definitions, events, dates, names, and rules that are to be developed, presented, or discussed. It should also contain notes on or an outline of all talks, lectures, or lengthy explanations to be made by the teacher. In planning the content to be taken up, the instructor should by no means confine himself to the textbooks, but should search other books and collateral readings for additional valuable and interesting material, the introduction of which would strengthen the work of the day.

In planning the organization of the subject-matter for the day, one need not necessarily be bound by the order of the text, nor is it desirable to deviate from it without feeling that better results may be obtained by so doing. The organization may center around a few well-chosen questions,

problems, or topics, rather than the logical organization of the book. It may be reorganized around the aim of the day's work as conceived by the instructor. It is quite possible that the organization should be made with the special needs, interests, and capacities of the particular class in view, as well as the special preparation point of view, and plans of the teacher.

In planning the procedure, the instructor should attempt to think through the entire lesson and plan the activity for the hour — how to start off, what approach to make to the lesson, and what methods will be employed in connection with each of the points in the entire outline. It is not a bad procedure, especially for beginning teachers, to budget the time of the class hour by assigning to the various units the amount of time each is likely to require. The teacher should form the habit of thinking of a number of possible procedures, and then arranging a program for the hour which will include the best methods for each type of content, as well as some variety. It is so easy to fall into the habit of confining teaching procedure to one or two methods only, such as the commonly used question-and-answer procedure, or the lecture and the written test. Among the possible items under the heading of procedure that may be considered are:

- Opening review.
- Opening problem and question.
- Short preliminary tests.
- Pupil reports, debates, or papers.
- Demonstration work.
- Blackboard work.
- Illustrative material, such as films, slides, charts, diagrams, maps, outlines, and reference to pictures in books.
- Explanations and lectures.
- Discussion of quiz papers.
- Socialized recitation.
- Pivotal or thought-provoking questions.
- Reading by teacher or by pupil.

Applications of things learned.

Contests.

Dramatization.

Games.

Summaries.

Drills.

Excursions.

Supervised study.

References to previous work, or correlations.

The planning of procedure should include the formulating of the pivotal questions previously referred to.

Planning the assignment. The assignment should be planned more carefully than any part of the procedure. In order that the assignment may be best made, the advance work, its aims and content, and its important points must be considered. The problems and exercises necessary to make the assignment definite should be formulated. Difficulties in the new work should be noted, and hints or suggestions thought out. Standards of proficiency in preparation should be thought over and determined. Attention must be given to see that the assignment is adjusted to the age, capacity, time, and opportunity of the class, and that references for use are available in sufficient number. The possibility of employing the flexible assignment or individual assignments should be considered, and such worked out, if necessary.

Writing out lesson plans. It used to be the custom of critic teachers and supervisors in normal schools to require all teachers doing practice work to write out in detail, each day, a formal lesson plan. In most schools such teachers in training were required to fit their plan for teaching into the scheme of the five Herbartian recitation steps. The artificiality and futility of such a requisite made the plan quite wasteful, and the practice has since been rather widely abandoned. It operated to cause teachers who could see no

merit in such lesson plans to cease writing out lesson plans entirely -- after completing their practice teaching. There is much to be said, however, in favor of writing out lesson plans on a sensible basis. Writing out aims, content, outlines, suggestions for procedure, and assignments operates:

1. To insure a more careful consideration of aim, procedures, and assignment.
2. To fix in mind the content, and thereby to free the teacher from the textbook and the possibility of error by forgetting.
3. To prevent the miscarriage of plans merely thought out by furnishing a memorandum for reference.
4. To lessen the preparation necessary for future classes in the same courses by virtue of a written record.

Forms and examples of lesson plans. In writing out lesson plans, the type form used in the examples given below is probably as serviceable as any other. The following lesson plans are not model plans, but they are typical, being selected from those made by the practice teachers at the University High School at the University of Oregon during the first semester of the school year, 1924-25.

I. COMMERCIAL GEOGRAPHY

Purpose: To learn why some States have become important in the manufacture of flour. To show how wheat is marketed, and its value as exchange, causing distribution of labor.

General topic: Manufacture of flour.

Specific topics: Leading manufacturing States. Marketing.

Previous assignment: Study the leading manufacturing States for wheat, pages 176 to 182 in text.

Procedure: Take each State individually, and tell why it has become a leading State in the manufacture of flour. If it has declined in this industry, cite the reasons therefor.

What are the benefits of exchange?

What is meant by a "stream" of wheat?

CONTENT

PROCEDURE

Check attendance, report absences.

About 1825 New York took the lead in wheat-growing, and consequently in flour-milling. Had advantage of early start.

Why has New York become a leading flour State?

Rochester.

What city in New York was especially important?

Wheat industry moved westward, and Rochester took up the nursery business.

Why has it declined in importance?

New York now ranks about second. Milling is about the ninth industry of the State.

How does New York now rank?

Early start.

Grain still raised here.

Buffalo is an important point of concentration; mills are convenient here.

Why does New York still retain this position?

Principal port of export is New York City, so grain likely milled here.

Minnesota.

What is the leading State to-day in the production of flour?

It is in the center of the wheat belt, and has abundant water and electric power.

Why do you think it should be so important?

Minneapolis, in 1890, became the leading milling city of the world, replacing Budapest, Hungary.

What city is especially noted?

CONTENT

PROCEDURE

Ohio — fifth.
Toledo — primary market.

How does Ohio rank with other States?

No center especially — just scattered throughout State. Grain is chiefly wheat, corn ranking second.

How is the milling industry located in Indiana? What is its principal center?

Chicago.

Where is the greatest primary grain center of the world?

South end of Lake Michigan, water front wide, harbor deep, railroad center, flour easily marketed.

How does its location help?

In 1914 Kansas ranked second. Mills are located all over the State. Important centers are Atchison, Leavenworth, Topeka, and Wichita.

Describe wheat conditions in Kansas.

St. Louis — because of its position on the Mississippi and its railroad facilities.

What city in Missouri is a noted wheat center? Why?

Specialization makes for skill — one part of country may be adapted for a certain kind of work, and another part another; e.g., the South raises cotton; the North manufactures it.

What are the benefits of an exchange of products?

Wheat gathered from farms flows into local centers, then to primary centers, and then to users in small streams again.

What is meant by the "stream" of wheat?

CONTENT

PROCEDURE

We produce more than enough for population, so export. If population continues to grow, the time may come when we shall need to import grain, though we may develop more intensive cultivation.

How does the consumption of wheat in the United States compare with the production?

New assignment: Clothing and clothing materials. Pages 183 to 188 in text. How are animals and people protected from the weather? What are the sources of clothing materials?

II. AMERICAN HISTORY

I. *Preliminary Items.*

- A. *Assignment for the day.* Draw maps of the Oregon country in 1815, showing the territory in dispute.
- B. *Aim.* To summarize the boundary dispute, and trace briefly the political history of Oregon to its admission as a State, in 1859.

II. *Recitation.*

THE BOUNDARY DISPUTE

CONTENT

PROCEDURE

A. *Review.*

- 1. Claims of United States and Great Britain to Oregon.

Place outline on board, and have pupils sum up chief factors in the dispute.

a. United States.

- 1. Gray.
- 2. Lewis and Clark.
- 3. Astoria.
- 4. Missionaries and settlers.

b. Great Britain.

- 1. Vancouver and Mackenzie.
- 2. Settlement of Hudson's Bay Company.

CONTENT

PROCEDURE

2. Beginning of boundary dispute at close of War of 1812.
 - a Settled by joint occupation.
(Maps to show territory in dispute.)
3. Settlement of Oregon.
 - a. Great Britain.
Hudson's Bay Company at Vancouver and French Prairie.
 - b. United States.
Missionaries.
Fur traders and trappers.
Emigration of 1843.
4. Interest in Oregon.
 - a. Sources:
 1. Lewis and Clark expedition.
 2. Irving's *Astoria*.
 3. Missionaries.
 4. Hall J. Kelly.
 - b. Interest of United States Government in Oregon.
 1. Slocum.
 2. Wilkes (insisted on Puget Sound).
5. Popular demand for Oregon.
 - a. Annual emigrations.
 - b. "Fifty-four Forty or Fight."
6. Boundary settled at 49°, in 1846.
England already planned to move Hudson's Bay Company settlement to Vancouver Island.

CONTENT

PROCEDURE

*B. Advance outline.***I. Formation of the provincial government, in 1843.**

1. Delay in making Oregon a Territory, due to struggle over slavery issue.

II. Demand of people of Oregon that Oregon be made a territory.

1. Petitions containing special needs sent to Congress.

2. Messengers sent to Washington.

a. Judge J. Irwin Thornton.

b. Joseph L. Meek.

III. Territory Government granted.

1. Slavery prohibited.
2. Two townships set aside for schools.
3. General Lane appointed Governor.
4. Granted free land — half-section.

IV. Oregon Territory divided. Washington organized, in 1853.**V. Oregon becomes a State, in 1859.**

Place main points of outline on board. Use mostly telling method, asking questions wherever there is probability of pupils knowing. Encourage them to make suggestions, and so seem to develop the lesson with the class, although there has been no assignment on material. Pupils required to take notes to use as guide in writing essay.

Assignment.

1. Write essays on "The Boundary Dispute."
2. Special reports on colleges.
 - a.* University of Oregon.
 - b.* Willamette University.
 - c.* Oregon Agriculture College.

- d. State Normal School.
- e. Pacific College. (Assigned to individuals of
- f. McMinnville College. the class.)
- g. Columbia University.
- h. Reed College.
- i. Eugene Bible University.
- j. Philomath College.

Special features to be noted for each college:

1. When founded, and by whom.
2. Where located.
3. How supported.
4. Purpose, or chief subjects taught.
5. If combined with another college, what one. Any changes in name or purpose should be mentioned.

III. ENGLISH I

Aim. To review orally the work covered in Part II, to clear up any confusion that may exist, and to gain a clear understanding of all the work.

General topic. Review.

Special topic.

Oral review of work covered in Part II.

Adjective and adverb phrases.

Appositives.

Participles ending in *ing*.

Gerunds.

Commas, with series and appositives.

Previous assignment.

Oral review of work in Part II.

Three sentences containing adjective and adverb phrases (three of each).

Five sentences containing appositives, participles ending in *ing*, and gerunds (five of each).

THE LESSON

CONTENT	METHOD
A phrase that modifies a noun or pronoun is an adjective phrase.	What is an adjective phrase? Have different students read some of their examples. Write several of these on board, having the students explain and give reasons.

CONTENT

A phrase that modifies any other part of speech is an adverb phrase.

Note — A phrase is sometimes far from the word it modifies — “With his book under his arm, walking along briskly he reached home before dark.”

Use “who or what” in studying phrases.

A noun that is set alongside another noun or pronoun to explain it is said to be in apposition.

Usually dropped disconnectedly into a sentence.

Sometimes separated from it.

Always in same case as word which it is in apposition with.

“To the boy, him in the front seat.”

“The boy, he in the front seat,” etc.

Words made from verbs, and used like adjectives or nouns.

A word that is formed from a verb and used like an adjective is a participle.

METHOD

What is an adverb phrase? Have different examples read and explained. Write some of these on the board.

Is a phrase always next to the word it modifies? Ask for examples.

What words do we use in studying phrases? Illustrate from one of sentences on the board.

What is an ordinary appositive? Ask for an example. Write several on the board.

Is an appositive always next to the word it explains?

In what case is an appositive noun or pronoun?

Have students pick out appositives in sentences 12-15, page 119.

What are “verbals”?

What is a participle? Give examples.

CONTENT

METHOD

As an ordinary adjective —
“Towering clouds.”

Predicate adjective — “Clouds
seem threatening.”

Appositively — “Mary disre-
garding instructions.”

They have no subject.

They cannot make a statement.

May have objects.

May have predicate nomina-
tives.

May be modified by adverbs.

Part of a verb.

Used as a noun — gerund.

A word in *ing* that is formed
from a verb and is used like a
noun is a gerund.

Participle modifies noun or pro-
noun.

Gerund is used as a noun.

In what three ways are they
used?

In what two important ways
are participles entirely differ-
ent from verbs?

In what ways do they resemble
verbs?

Sometimes *ing* words are not
participles. If not, what are
they?

Have students read their sen-
tences containing participles.
What is a gerund?

Ask for examples, and write
them on the board.

Difference between participles
and gerund?

Ask for any general or special
questions the class may have
about the work. Explain these.

Assignment.

Written quiz on work in Part II. Entire period for this. Stu-
dents to be held responsible for all the work covered in the review.

It will be noted from the foregoing that the method or
procedure is written in a column parallel to one containing
the content to which the procedure applies. This device is

quite useful, as the teacher in referring to the lesson plan is thereby able to follow the content and procedure simultaneously, as he would wish to do.

The two following plans, written by teachers in the University of Illinois High School, are typical practical plans of superior quality.

PHYSICS

Prepared by J. W. Appling

(Taken, by permission, from Walter S. Monroe's *Planning of Teaching*, pp. 8-10.)

Lesson I

I. Aim. To study the heating and ventilating system of the University High School, with special emphasis on the principles involved. (The class has already studied most of the principles involved.)

II. Assignment (made at preceding meeting of class).

1. Questions to start thinking, and some discussion:

- a.* What devices do you see in this room which might be related to heating and ventilating?
- b.* Why use two thermometers in each room?
- c.* Why do some pipes in the room have a covering while others do not?
- d.* What is the source of heat for our system?
- e.* Can this room be kept at a uniform temperature all day?
- f.* How does a compressed air thermostat operate?

2. Reference: *Practical Physics*, Millikan and Gale, pp. 210-13.

III. Presentation of new material.

FACTS OR PRINCIPLES TO BE TAUGHT	METHODS USED TO TEACH EACH FACT OR PRINCIPLE
1. Steam-heating coils are used to help heat the room. (There are no ordinary steam radiators in the room.)	1. <i>a.</i> What are the horizontal pipes near the ceiling used for? <i>b.</i> Are these sufficient to heat the room? <i>c.</i> Why are some pipes covered?

FACTS OR PRINCIPLES TO BE TAUGHT	METHODS USED TO TEACH EACH FACT OR PRINCIPLE
2. Warm air is used to help heat the room. (The Beery System is used.)	2. a. Can air which is used for ventilating be used to help heat the room? How? b. Where could such air enter the room? c. How can we determine where the air enters? (Demonstration using candle flame.) d. Heated air is lighter or heavier than cooler air? e. How do you account for the heated air entering above and leaving through vents near the floor? f. Ask pupil to sketch on the blackboard direction of air currents in the classroom.
3. Thermostats are the automatic devices which regulate temperature. Their operation depends upon the bending of a bi-metallic bar due to unequal expansions caused by heat. This bending finally operates compressed-air valves, and the compressed air then regulates steam valves and air dampers.	3. a. How does the room maintain so uniform a temperature? b. Describe how a thermostat operates. c. The principle and operation of the thermostat is shown by an excellent film which can be borrowed from the Johnson Service Company, Milwaukee. This film contains a good series of animated drawings, which show very clearly how the thermostat works. As a substitute, their catalogues and descriptive matter are very good.

FACTS OR PRINCIPLES TO BE TAUGHT	METHODS USED TO TEACH EACH FACT OR PRINCIPLE
4. The success of this system depends upon every one in the school knowing the importance of keeping windows and doors closed; and upon every one in the school co-operating.	4. <i>a.</i> The teacher opens a window. Just how does this affect the air currents (1) in the room? (2) In the building? <i>b.</i> How can the importance of keeping windows and doors closed be impressed on the rest of the school? (Use of assembly, posters, etc.)

IV. Summary.

1. How would you sum up the means of heating our classroom?
2. How is our classroom ventilated?
3. What means are provided to keep the temperature of the room uniform?

V. Assignment.

1. The teacher announces that during the laboratory period an inspection of the heating and ventilating system will be made. Following the inspection each pupil will write a report on it.
2. Reference. (Found on reserve in the library.)
Willard, A. C. *The Heating and Ventilating System of the New Education Building, University of Illinois.*
Blue-prints showing the arrangement and how the system operates.

ALGEBRA I

Prepared by S. Helen Taylor

(From same source as the preceding lesson, pp. 27-29)

Lesson I

DEVELOPMENT OF ADDITION OF FRACTIONS

- I. *Aim.* To aid the class in formulating a plan for adding fractions with monomial denominators.
- II. *Assignment* (made previous day).
 1. Problems 1-10, p. 141; Problems 15, 16, 19, 20, p. 142.

2. Text: *First Course in Algebra*, by Rietz, Crathorne, and Taylor.

III. Review and development of new topic.

SUBJECT-MATTER

METHOD

(Direct questioning with board work)

- | | |
|--|--|
| <p>1. A fraction is one or more of the equal parts into which a whole has been divided, or an expressed division; ($3 \div 5$, written in form $\frac{3}{5}$).</p> | <p>1. State a definition of a fraction. (Ask of slow students until it is well formulated.)</p> |
| <p>2. Numerator is the first term or dividend, and denominator is second term or divisor.</p> | <p>2. What are its parts?</p> |
| <p>3. A numerator numbers the parts to be taken, a denominator names the kind taken; or the numerator is the dividend, the denominator the divisor.</p> | <p>3. Explain the meaning of these words. (The Latin students will volunteer here.)</p> |
| <p>4. Changing to equivalent fractions by multiplying and dividing by a common factor, also change of signs of fractions.</p> | <p>4. In the past week's work with fractions, what operations have we considered? (Teacher lists these.)</p> |
| <p>5. Numerator and denominator of a fraction may be multiplied by the same number without changing the value of the fraction.</p> | <p>5. Will you give one fundamental principle which will justify our work?</p> |
| <p>6. Only similar terms can be added.</p> | <p>6. In addition of fractions we shall need to recall our ideas about algebraic addition. What are the important facts?</p> |

SUBJECT-MATTER

7. Similarity indicates that fractions are alike in kind or name, hence the denominators are alike.
8. With simple fractions from arithmetic, as plus, plus, and finally with plus, and plus the three steps of the plan are formulated.
 - a. The L.C.M. of the denominator is chosen.
 - b. Each fraction is changed to an equivalent fraction with this denominator.
 - c. The numerators are added, and the result written over the L.C.D.

METHOD

7. When are fractions similar? (Let examples be given first. This is a new word as applied to fractions, class will decide on meaning in this case.)
8. The teacher suggests that several go to the board and add some fractions. While they do this he will give a problem for the remainder to do on scrap paper. Let some pupil suggest fractions containing letters in denominators, for pupils enjoy making their own problems. From the problems on the board, a plan will be made orally.

IV. Generalization.

The plan discussed in (8) will be written, step by step, with a type problem.

The teacher will have one of the best pupils work out a type problem, writing the reason by each step.

V. Assignment.

1. Exercises.

- a. Perform orally the addition on p. 144, Nos. 1-10.
 - b. Write out problems 1-10, p. 145.
 - c. Be able to state clearly what you are doing.
2. Text: *First Course in Algebra*, Rietz, Crathorne, and Taylor.

Using the daily lesson plan. Lesson plans should be taken into the classroom for use there. It is much better for the teacher to refer to the content-outline as a guide to the material for the day than to the textbook. The teacher who dares not lay his book down for any considerable

length of time is open to suspicion, and yet the teacher is entitled to refer to notes for reference. The method thought out in advance should be referred to as often as is necessary, rather than run the risk of getting mixed up in procedure.

To be sure, deviation from a fixed program may often be advisable, though ordinarily it is desirable to work back to the prepared procedure. Sometimes teachers feel that their lesson plans are of little use because they rarely refer to them, and because they never seem to be able to follow them in all details. The very fact that a lesson plan has been made is a help, even if it is never taken into the classroom. Sensible deviation from the procedure in a plan, as the occasion seems to demand, is several degrees removed from an out-and-out, impromptu, catch-as-catch-can procedure.

Lesson plans should be preserved, to be used and improved from year to year. In the case where a beginning teacher works up four or five new courses the first year, it is impossible to do much careful lesson-planning for all of the subjects, but in those classes where he is least sure of himself careful lesson-planning should be done, while he may from necessity resort to hurried notes on content and assignment for the other subjects until he has a better opportunity to write adequate plans. The fact that only a few teachers actually write and preserve their lesson plans should not deter the young teacher who expects to stay in the profession from adopting such a policy. If one is to succeed in being more than a "school keeper," he must use methods that make for efficiency and ultimate conservation of effort.

Lesson-planning in varying types of procedure. The kind of lesson plans to be formulated naturally will vary with the type of procedure being used. The forms recommended

in this chapter are those especially adapted to the regular recitation method. Lesson-planning is no less useful, though, when special types of class procedure are being used than for the traditional recitation. Where socialized class procedure is being employed, lesson-planning which will take care of the problems and activities arising daily is quite necessary. The planning of supervised-study periods involves considerable thought. Care must be given to planning so that the recitation may be kept within bounds, and attention must be given to adjusting the assignment to the amount of time which will be available for supervised study. In addition the teacher should make note of special helps to be given, of assistance to be given special pupils in need of help, and of extra work for bright pupils. All these need to be carefully looked after in advance.

Where project teaching is employed, stock should be taken daily as to the most fruitful and economical use that may be made of the opportunity for supervision at the next class hour. Often references should be located for the particular problems of some pupils. Quite often a little thinking needs to be done by the teacher on especially difficult problems some pupils are meeting in their projects. More often than not, it is better to make note of all these things before the class hour, to insure that they will not be overlooked.

When visual instruction is to be used, notes for comments preceding and accompanying the presentation of the material should be thought out. The preparation of the class in advance should be thought through, and the follow-up discussions should not be left as impromptu procedure.

With questioning, assignment, review work, and planning considered, we are now ready to pass to study-procedures and to the supervision of the pupil at work. These we shall take up next in the two chapters which follow.

QUESTIONS AND EXERCISES

1. What are the purposes or possibilities of planning a semester or a year course in advance? Make a list of these.
2. Write out a carefully thought-out list or statement of the purposes for which your subject should be taught in the high school. To what extent do teachers plan their daily work directly toward the accomplishment of these aims, taking each aim separately?
3. Add three possible items, which may be considered under the head of procedure, in addition to those mentioned in the chapter.
4. What are the values likely to result from careful daily lesson-planning?
5. Do you believe it to be necessary for beginning teachers to write out lesson plans? Experienced teachers? Give reasons for your answer.
6. Write a paragraph or so, about 300 words, on the "Use of the Lesson Plan during the Class Period."
7. Select one of the lesson plans given as examples, and criticize and evaluate it in detail as a lesson plan.
8. Make a typical lesson plan, in some high school subject, for some daily unit of subject-matter.
9. Consider the advisability of placing both content and procedure in one column in lesson-planning, making no distinction between the two. What are the relative merits and disadvantages of such a scheme?

SELECTED REFERENCES

- Charters, W. W. *Methods of Teaching*. Chicago: Rowe, Peterson & Co., 1912. Pp. 415-32.
- Colvin, S. S. *Introduction to High School Teaching*. New York: The Macmillan Co., 1917. Pp. 334-59.
- Foster, Herbert H. *Principles of Teaching in Secondary Education*. New York: Charles Scribner's Sons, 1921. Pp. 247-55.
- Minor, Ruby. *Principles of Teaching Practically Applied*. Boston: Houghton Mifflin Co., 1924. Pp. 259-62.
- Monroe, W. S. *The Planning of Teaching*. Urbana, Illinois: The University of Illinois. Bulletin of Educational Research, No. 31, 1924. P. 41.
- Nutt, Hubert Wilbur. *Principles of Teaching High School Pupils*. New York: The Century Co., 1922. Pp. 259-65.
- Parker, Samuel C. *Methods of Teaching in High School*. Boston: Ginn & Co., 1915. (Revised, 1921.) Pp. 475-91.
- Stormzand, Martin J. *Progressive Methods of Teaching*. Boston: Houghton Mifflin Co., 1924. Pp. 327-46.
- Strayer, George Drayton. *A Brief Course in the Teaching Process*. New York: The Macmillan Co., 1923. Pp. 167-223.
- Waples, Douglass. *Procedure in High School Teaching*. New York: The Macmillan Co., 1924. Pp. 138-47.

Publications of the United States Bureau of Education, Washington, D.C., containing discussion of aims and content of subjects taught in high school.

1. *Agriculture in Secondary Schools*. Bulletin 35. 1920.
2. *Business Education in Secondary Schools*. Bulletin 55. 1919.
3. *Music in Secondary Schools*. Bulletin 49. 1917.
4. *Physical Education in Secondary Schools*. Bulletin 51. 1917.
5. *Reorganization of English in Secondary Schools*. Bulletin 2. 1917.
6. *Reorganization of Home Economics in Secondary Schools*. Bulletin 5. 1922.
7. *Reorganization of Science in Secondary Schools*. Bulletin 26. 1920.
8. *The Social Studies in Secondary Education*. Bulletin 28. 1916.
9. *The Problem of Mathematics in Secondary Education*. Bulletin 1. 1920.

CHAPTER IV

SUPERVISING PUPIL STUDY

1. *The need for study supervision:* The importance of supervising learning activity — A new type of high school pupil — Inadequacy of home study — Physical conditions and distractions — Improper home help — Study-hall study.
2. *Types of supervised-study plans:* Limitation of the term — The alternate-period plan — The unassigned-lesson plan — The Batavia and the study-coach plans — The conference plan — The library-study-hall plan — The double-period plan — The divided-period plan.
3. *Place of supervised study in the class period:* The flexible plan of class-period division — Abuse of the flexible plan — Recitation or supervised study first.
4. *The assignment and supervised study:* Length of the assignment — Assignments for junior high school and for the double-period plan — Time for making assignments.
5. *Class management in the supervised-study period:* Preparatory steps — Distractions — Mistakes in management — The right way — Equipment for the supervision of study — Preserving self-reliance — Socratic questioning — Individual differences and supervised study — The absentee and the transfer pupil — Studying other subjects — Revised assignments and class helps — Group study — Establishing favorable relations — Studying pupils — Desirable human qualities.
6. *Supervised study and other types of class management:* Supervised study not necessarily an alternative to other methods — Supervising the study of pupils without special supervised-study organization.
7. *Supervised study and laboratory teaching:* Supervised study in the laboratory, commercial and art rooms, and the shop — Supervised study here of two types; drill and problem-solving — Special suggestions on laboratory supervised study.

Questions and exercises — Selected references.

1. *The need for study supervision*

The importance of supervising learning activity. Miss Helen Parkhurst, a few years ago, in one of a series of lectures explaining the "Dalton plan," made a statement to the effect that teaching was ordinarily well done, but that this was not so true with learning. Unfortunately, as

we have noted, it is only the learning that counts. The function of teaching is merely to provide the most favorable situations for learning — to arouse interest and effort, and to direct the effort aroused so that it will result in that modification of the nervous system which constitutes “education.” The pupil-response is the actual learning; the teacher merely provides stimuli and opportunity for the desired reactions. The thing which is educative is the response of the pupil. However important the activity of the teacher may be, indirectly, it is only as a means for promoting the really important thing — the activity of the learner.

As teachers and administrators have come more thoroughly to realize this fact, more attention has been paid to providing types of instruction that will promote pupil activity. In the first place, much more attention has been paid to the matter of having pupils approach their work with favorable attitudes of interest and zeal, and to the arranging and introducing of school work by means of problems or other means of arousing interest. We have thus tried to secure a higher type of activity on the part of the learner, that the learning may therefore be more effectively accomplished than under the old régime of compulsion, fear, and rivalry. Merely arousing interest in educational activities, though, is not sufficient; the interest when aroused must be guided, and directed, and encouraged. This has in the past been inadequately done; the offices of the teacher have been confined largely to stimulating effort and testing results.

While high school pupils without doubt should assume much more responsibility for their own education than they do, and while the modern trend in the theory and practice of teaching is in that direction, as may be seen in the development and increased use of the socialized recitation, problem-

solving instruction, the project method, and the Dalton plan — all of which tend to cast the responsibilities for learning upon the student — high school pupils, nevertheless, need to be given very thorough and very definite training in the technique of effectively discharging such responsibility. Lesson-hearing, as a function of the classroom teacher, is rapidly giving ground to the more careful direction of student effort.

A new type of high school pupil. The need for training students in the technique of study has also been accentuated by the rapid increase in high school enrollments that has taken place during the past quarter of a century. The student who now is the typical or average student in the high schools is a somewhat different type of material from the student who belonged to that selected group of young people who continued through the secondary school a generation or so ago. The latter was largely a serious group, with a life-career motive of a cultural or scholarly type. Usually, too, they were of a literary turn of mind, took somewhat naturally to books, and the necessity for the supervision of their study was largely absent. On the other hand, the high school pupil of to-day has more need for being interested in his work by the teacher, and, as compared with the average student of the earlier period, is much less capable of independent study.

Inadequacy of home study. In the past, too, the preparation of assigned work for high school classes has been undertaken largely in out-of-class situations — chiefly in the study hall and at home. In the upper grades of the elementary school, the study of assigned tasks has been carried on in the classroom while another group was reciting. Excepting the rather rare instances where teachers have supervised the study of pupils in the study hall and the classroom, the pupil's attack on assigned work has been

done without the immediate guidance, supervision, assistance, correction, or encouragement of the teacher. It is little wonder that the results from such procedure have been unsatisfactory. Even with adults, engaged in industry, business management, teaching, and other activities, it has time and again been shown to be economical to place unit-groups of workers in charge of leaders, whose business it is to guide, direct, inspire, encourage, test, and correct, and also to study methods for improving the efficiency of the workers of their respective groups. Efficient supervision of study activity has been found to result in a similar increase in effectiveness for the learner.

It is quite unlikely and possibly undesirable that all home study should be eliminated. Whether or not we decide for or against the continuation of some home study, though, it seems quite certain that no great reliance can longer be placed on the home as a place where the non-recitation phases of school learning can take place. A number of factors operate to restrict the effectiveness of home study.

Physical conditions and distractions. In the first place, the physical conditions prevailing in most homes of to-day are not favorable to home study. In relatively few are work places available where quiet, proper light, and comfortable heating may at the same time be had. In by no means a majority of the homes of high school students is there a room suitable for evening study. On the contrary, in many the only heated rooms in winter are the common living-rooms, which quite naturally are not to be thought of as constituting favorable study conditions.

The possibilities of distractions, too, are legion. The evening family conversation, the play of smaller children, bedtime stories, corrections, and the guests of brother, sister, and parents as well as one's own guests, stand in the way of study. The temptations of other evening occu-

pations and amusements tend to break down the regularity of home study. The movie, the dance, the party, games at home and at the houses of friends, clubs, and social groups generally offer satisfaction to youthful instinctive tendencies which can be resisted, by the ordinary boy or girl, only under favorable conditions of restrictions such as exist almost alone at school. The old days of the evening study and reading hour, when all school children gathered around the table for lessons regularly after supper, to be joined later by their elders, has largely passed away. Even where such conditions still linger there remains the question of the economy of study at the close of the day. It is more than likely that the best part of the day should be used for school purposes, and evenings left for lighter and more interesting occupations.

Improper home help. Another factor in the consideration of the efficacy of home study is the doubtful value of home assistance. All too frequently assistance by parents, and by older brothers and sisters and friends, is likely to be of little educative value. It often operates to confuse rather than to clarify, because of the differences between the explanations and methods of teacher and home helper. My boy, now in the sixth grade, tells me quite frequently that my assistance is unsatisfactory — that “that isn’t the way the teacher wants us to do it.” In most instances the educational growth resulting from judicious and well-planned assistance is not furthered by home help. The efforts at teaching on the part of the helper are not only likely to be ineffective, occasionally resulting in dissatisfaction to both parties and operating to provoke dislike for the subject or topic under consideration, but too often the teaching act is omitted entirely and the problem or exercise, calculated to produce educational growth in the pupil, is solved for the student by the helper. Most high school

students, too, are impatient with home "teaching," and are interested primarily in getting the correct answer.

Again, while group work and "socialized" procedure is to be favored, under appropriate conditions, the coöperative home study of classmates is also of doubtful value. It is likely to be only a collateral activity along with distracting social conversation, and is quite generally inferior to study under the supervision of the teacher.

Study-hall study. It is quite generally conceded that study-hall study is in most instances more effective than home study. More favorable physical conditions, the atmosphere of work and the example of others studying, a minimum of distractions, and a minimum of unwise assistance all unite to keep study-hall work free from the objections leveled at home study. However, supervised or directed study is better done when supervised by the instructor who is in charge of the work studied. Special difficulties of individuals demand attention, and these he can meet better than any one else. As we examine the possibilities of supervised study in the pages which follow, we shall note many advantages and opportunities which are not likely to be realized through the medium of study-hall study.

2. Types of supervised-study plans

Limitation of the term. At the outset, it should be recognized that the term "supervised study" may be used to mean only the activity of the study portion of the class period, or it may be used in a much broader sense. It may equally well be used to embrace all of the activity of the pupil under the guidance and stimulation of the teacher. Supervising study would then include the whole of the teacher's activities, assignments, explanations, discussions, testing, and all. When used in this sense, the socialized

recitation, the project method, the Dalton plan, and visual instruction — all of which we shall consider in this and the chapters which follow — are merely phases of supervised study. In the discussion of this chapter we shall limit our use of the term to designate that type of organization and classroom activity which provides for a closer personal supervision of the student while “studying.”

There have been so many plans proposed and described for supervising pupil-study that it is difficult to classify them, and we cannot go into detail concerning all these in this work. Instead, we shall mention several of the most prominent types used, and describe in detail the prevailing plan.

The alternate-period plan. In many schools the officials have not considered it necessary or practicable to have every class period include supervised study, but they have nevertheless felt the need for training pupils in methods of study. In a number of such schools, one period a day is given over to supervised study, and this period is alternated; that is, the first period of the day on Monday is used for this purpose, the second period on Tuesday, and so on. Usually this period is somewhat longer than the other periods. The additional time — usually twenty or thirty minutes — is spent in preparation of the work for the following day under the supervision and guidance of the instructor, who at this time observes the methods of study of his pupils and attempts both to train them in more effective technique and to give attention to individual cases. A special form of this plan was worked out and put into operation at DeKalb, Illinois, a decade ago, and has frequently been described in periodical literature.

The unassigned-lesson plan. This form is easily arranged, as any teacher may turn any class period into a supervised-study period by making the assignment to be

studied at the beginning of the class hour, rather than at the close of the previous one. The remainder of the hour is then spent in the attack of the work just assigned. Monday is a favorite day for such "supervised-study" lessons, since Monday lessons are, as a rule, likely to have received less than average outside preparation. By this plan individual teachers may train their classes in studying, even though the school as a whole is not committed to the plan.

The Batavia and the study-coach plans. The Batavia plan of supervised study has been so called because it was first employed at Batavia, New York, by Superintendent John Kennedy. A desire completely to use school buildings built with rather large rooms (seating fifty to seventy pupils), together with a desire to individualize the instruction, led Superintendent Kennedy to place two teachers in a few rooms (at first in but one room) with a group of pupils somewhat larger than ordinary — sixty to seventy. While one teacher conducted a recitation with one group, the second teacher supervised the study of another group. Departmental teaching led to an alternation of the teachers in recitation and study rôles. The effectiveness of this plan became so apparent that it was made practically uniform throughout the schools of the city, and later was adopted in a number of other cities. Because the plan as originally carried out calls for buildings with rooms of much larger size than are advisable for other types of school organization, wide modifications of the idea have since been worked out. The plan was much talked of a couple of decades ago, but it has since been largely discarded for other more useful methods.

The study-coach plan may be said to be a form of the Batavia plan. Under this arrangement some teachers spend their time in directing the learning of special groups — usually the slow and backward pupils, pupils just returned

after absence, misfit entries from other schools, and students with apparent special-subject disabilities. These teachers have special rooms to which such pupils are sent, temporarily or permanently. Such rooms are often called "opportunity," or "make-up" rooms. The technique for such instruction is being slowly worked out as a special field.

The conference plan. Teachers from the beginning have no doubt occasionally resorted to after-school instruction to bring up backward pupils, or to give especial encouragement and work to bright and interested ones. This is in a sense supervised study. As an extension of this idea some teachers have developed a system of pupil conferences, devoting a certain amount of time each day to such work. This type of effort has no doubt been of value to the student who received the benefits of such conferences. It is, however, perhaps unwise and unfair to have teachers do much of this type of work, in addition to the usual strenuous day. It is unfair to the teacher, and unfair to the classes in the preparation for which he should be employing such time. In some schools the teaching assignments have been shortened to four or five classes per day, and provisions made for instructors to conduct conference hours at which volunteers, or those designated by the teacher, may be given help, encouragement, and instruction.

The library-study-hall plan. Another form, recommended in the case of larger high schools, is the library-study-hall plan. One large combination study hall and library, similar to those found in colleges and universities, needs to be provided. In this hall, as far as is practicable, at desks or tables, or in offices or workrooms adjacent, one teacher may be found for any period of the day for each of the major literary subjects — English, mathematics, science, foreign languages, and history or social science.

Students are not especially encouraged to consult these

teachers, but it is contemplated that the teachers, whenever it seems advisable, will be able to confer with students needing special help or special assignments. While this type of supervised study has several weaknesses, it has the merit of lessened cost, and it also removes the objection often made to supervised study in the classroom, namely, that books and materials are not accessible. It is not possible by this plan, however, to conduct group or socialized supervised study, which is in many instances much more effective than silent individual study.

The double-period plan. The double-period plan contemplates two equal periods of thirty-five to forty-five minutes each, the first of which is spent in the usual recitation work, and the other is given over to study and preparation of the work for the following day.

Viewed from a practical point of view, there are two serious objections to the double-period plan, namely, increased cost, and the necessity for a lengthened school day. It is quite evident that teachers under the double-period plan should not be assigned more than four classes. If the teacher is to have any extra duties, such as the supervision of extra-curricular student activities and organizations, this assignment must be reduced to three. Even where no such extra duties are involved, and where teachers are given four double periods, it is quite likely that teachers will feel it necessary to use a portion of the study period for the marking of papers, making records or reports, or making preparations for future class periods. As it is common practice where only a forty or forty-five minute period is used, to assign teachers five or six classes daily, an increase of expense resulting from the increased number of teachers necessary to adjust the double-period plan of supervised study is almost prohibitive.

The plan of four double periods can be arranged on a six-

hour day only by confining all pupils to a maximum of four studies. A fifth study, and such subjects as physical education, art, and music may be given only by employing a longer school day. It is quite possible, however, that the increased efficiency of the school work done by the pupils is worth the additional expense, and much can be said in favor of a longer school day and the elimination of the necessity for depending upon home study.

The divided-period plan. Because of the additional expense and the necessity for a longer school day involved in the double-period plan, plans involving shorter periods have been more generally adopted. The most common plan is that of a school day of six periods, of sixty minutes each. Though by no means universal, necessary, or even the most desirable plan, the sixty-minute period is the most commonly employed unit for supervised-study organization. In a number of schools a five-period day is in operation, there being three seventy-minute periods, running from eight-thirty to twelve o'clock in the morning, and two such in the afternoon. In such a school, students may carry five subjects when it is desirable that they should do so, and teachers are usually assigned four teaching periods. Different variations of this arrangement are to be found.

In a few schools a lengthened school day of six seventy-minute periods is employed. In others a six-hour day is made up of two forty-minute periods, and four seventy-minute periods. Manual training, household arts, and laboratory-science subjects are concentrated in the four seventy-minute periods; while subjects and classes thought to have less need of supervised study or of longer periods, such as advanced English and social-science classes, sections of superior pupils, music, assemblies, and military drill, are given the forty-minute periods. In still other schools, where only forty- or forty-five-minute periods are available, many

teachers plan to reduce the recitation time so that a portion of the hour may be given over to supervised study. Under this plan the period is divided into two portions, the first for recitation and the latter for supervised study.

3. Place of supervised study in the class period

The flexible plan of class-period division. During the first few years of the supervised-study movement, the custom was quite general to divide the class period, whether it be a double period or merely a lengthened period of fifty, sixty, or seventy minutes, into two divisions of approximately equal length, one for recitation and one for supervised study. From the beginning, though, there were schools where it was thought best to leave the division of each individual period to the discretion of the teachers in charge.

If properly administered by the classroom teacher, there can be no question but that there is a distinct gain to be realized from the use of the more flexible plan. There will be days when the recitation and the assignment should require more than one half of the period. It is at times profitable even to spend a large share, or even all of a class period in assignment. It is possible also that on certain days more than half of the hour should be spent in recitation work, while it is equally certain that on some days considerably less than half of the hour need be spent on reciting. The new spirit permeating teaching contemplates less reciting, less teacher activity, and more teacher and pupil co-operation. While, to be sure, there will always be teachers who seem unable to interest pupils in their work except through fear of the recitation hour, this means of motivation, used so generally in the past, can hardly be said to have been very effective, and has by now been thoroughly discredited as a desirable source of pupil inspiration.

It is a common experience of teachers, too, where sufficient time is used for supervised study, and where that time is properly spent, that there is less need for recitation work on the following day. Less unsatisfactory pupil-recitations and fewer admissions of unpreparedness are experienced when adequate provision for supervised study has been made. While there is, on the other hand, a tendency on the part of pupils to spend more time in the discussion, as they now have more to say, are more interested, and have more confidence in their contributions as a result of their better preparation, it is safe to say that the same quality of recitation can be carried on in less time where supervised study is used than where it is not. So, if proper provision is made for supervised study, less time will need to be employed in recitation work.

Teachers should determine the best division of the class periods in view of the nature of the work being done at the time. For example, on some days a teacher of mathematics may spend the entire class hour in preparing the students for study, and perhaps the next day the entire hour may be spent in working exercises or solving problems under supervision. This may continue perhaps for two or three days, with short periods for additional and special instruction at the opening of the period. As another example, an English teacher may spend a whole period in preparing a class for writing a composition, and then all of the next class meeting or of several meetings may be spent in writing it. In cases where problems and projects are employed, it is quite likely that periods of several days of supervised study will occur during which there is no recitation work. It is quite likely that the present movement away from "spoon feeding," away from assigning little daily tasks to be checked up sharply on the following day, is in the direction of better results, and that assignments of much larger scope —

“units,” “problems,” “projects,” “challenges,” etc., such as “working up” the Unification of Italy, the study of an entire piece of literature in a foreign language, an entire chapter in algebra, or an entire topic in physics — may come to be used more and more. It seems the more natural way for people to do things. Such a plan could hardly be fitted onto a scheme of fixed division of the class period between recitation and supervised study.

Abuse of the flexible plan. Only a fraction of the schools embarking on a supervised-study program are able to realize anything like its full value, partly because of the inability of teachers to reserve an adequate portion of the class period for study. Good management is necessary in this respect. Altogether too commonly teachers permit the recitation work to encroach upon the study time. Students complain, justly, that their study-hall time has been taken to provide more time for recitation. Conscientious students, in consequence, find it necessary to spend more time in home study; others sense the futility of trying to keep up, and come to class day after day with lessons but poorly prepared. Usually it is the teachers of these classes who are least enthusiastic about supervised study. If supervised study is to be a success, this fundamental principle must be kept in mind — *that, on the average, at least one half of the time spent in class must be given over to some form of supervised study.*

It is argued in favor of the plan of having study precede the recitation that in this manner study periods are insured against teachers whose terminal facilities are somewhat undeveloped, and who deem it necessary to search out each nook and cranny in the recitation. In desperation many principals have resorted to the plan of dividing the period arbitrarily into approximately equal periods, and of having a bell rung at the division time to mark the beginning of the

supervised-study period. However odious this may be to teachers, it is probably more so to principals. The necessity for such a procedure ought never to be allowed to develop. In some schools, visited by the author, the traditional forty minutes of recitation have been demanded by the teachers. As a result the time remaining for supervised study rarely exceeds ten minutes, often nearer five, and in most instances this is not only time wasted but leads to disciplinary problems as well. Students are unwilling to start study with so short a time at hand, preferring to postpone it until a more favorable opportunity. Others use the time to glance over the work for the coming hour. Teachers in these schools frequently use the entire class period in recitation and assignment, in order not to have the students "on their hands" the last five or ten minutes of the hour.

In his book on *Supervised Study*, Hall-Quest lays down, as a general principle, that "the daily recitation should occupy one fifth of the time, the assignment two fifths, and supervised study two fifths." Supervised study is hardly likely to succeed unless at least two fifths of the time spent in class is on the average reserved for study.

Recitation or supervised study first. Many teachers raise the question whether it would not be better to have the study precede the recitation. The claim is advanced that at this time students will study with much more vigor and enthusiasm, and that, because of the more favorable attitude on the part of the learner, much better results may be obtained in the same amount of time. It is also pointed out that such a plan insures a proper proportion of the class hour being devoted to study, and that the use of such a procedure will automatically dispose of the problem of the pupil's desiring to spend too much of the supervised-study time studying for some other class.

On the other hand, several objections may be raised im-

mediately. Of rather doubtful merit is the claim that such a procedure would result in less effective preparation due to the fact that the student has only to prepare for a recitation a few minutes in the future, instead of preparing for a recall twenty-four hours ahead. A more serious objection lies in the danger that many pupils will succumb to the temptation to leave all preparation until the study period, whereas, when the study period follows the recitation period, the work begun in class will be completed in the study hall or at home. Where a period of eighty or more minutes is employed, and little or no outside study is contemplated, this objection would apply with less force.

In order to test the relative advantages of the two possible plans, the author, with the assistance of a member of the faculty of the University High School of the University of Oregon and two practice teachers, conducted a carefully controlled experiment with two sections of junior high school pupils studying the history of the United States. In one section the study regularly preceded the recitation; in the other the reverse order was followed. Very little study outside of class was required. The progress of the class during the experiment was carefully measured, and the results indicated no appreciable difference between the effectiveness of the two methods, though both teachers preferred to have the study precede the recitation. This experiment will be described in some detail in the final chapter of this book, as an example of how teachers may themselves test teaching procedures.

4. The assignment and supervised study

Length of the assignment. In the management of supervised study, certain special problems are involved relating to the adjustment of assignments to the time and opportunity of the pupils. Under the old plan of forty-five-

minute periods for recitation, it was generally conceded that it was not unreasonable to expect students to spend approximately an hour on the preparation of each subject. This assumption implied from one to two and a half hours of home work, depending on the ability and conscientiousness of the student, the number of subjects he was enrolled for, and the length of the school day. There is no reason to believe that under a supervised-study plan more home study should be required. In fact, supervised study carries with it the hope, if not the avowed intention, of reducing the amount of home study, and in case the school day is lengthened, of eliminating home study for most pupils, almost entirely. It is very probable that the amount of home study that should be counted on is about an hour. If a sixty- or seventy-minute period is used for supervised study, most students will have, in school time, probably one such period daily for study. This, with an hour of home study, makes available two hours for outside study. Distributing this time over four classes results in an average of thirty minutes of study for each subject.

It seems that, if the foregoing is sound reasoning, in schools where sixty- or seventy-minute periods with supervised study are employed, assignments involving for the average pupil approximately thirty minutes more than can be done in the time spent in supervised study should be the aim. The fact that it is difficult to foretell, when planning assignments, just how much of the class hour will be used in supervised study, often makes it necessary for the assignment planned to be revised when it is given, and occasionally to be shortened or lengthened after it has been made. For obvious reasons, this last measure should be resorted to but rarely, and only in cases where it is clear that the assignment will involve considerably in excess of the thirty minutes of preparation.

Assignments for junior high schools and for the double-period plan. Where the double-period plan is used in the senior high school, assignments should be so adjusted that the brighter members of the class can do them thoroughly during the class time. Home study should be necessary only for special types of work not conveniently done at school, or for slow or extremely ambitious pupils. One of the most attractive plans for the organization of supervised study in the junior high school is a day of six sixty-minute periods. As each student is, as a rule, enrolled for five subjects — English, history or other social science, mathematics, natural science, and either a foreign language or manual or household arts, plus some work in the æsthetic arts and physical education — all the six periods are required for class meetings, and there are no study halls. Under these conditions, assignments should be aimed to be of such length and difficulty that the average student may ordinarily complete them in class under supervision, and the brightest ones may do supplementary work in addition to the regular course. Daily home study is then contemplated only for the slower students, occasional home study for those of average ability, and home study for all only when the teacher guesses badly.

Time for making assignments. When there is no supervised-study period, much can be said for making assignments at the beginning of the hour. At this time attention is more easily secured, and sufficient time may be taken. However that may be, when assignments are to be followed by supervised study, the proper time to make them is at the close of the recitation. Assignments should be made to grow normally out of the previous lesson. Often they will be the unsolved problems, the unfinished business of the period. Usually they can best be made in view of the developments of the recitation. As often as possible they should be the

natural development of the work, and should not appear in the light of tasks somewhat arbitrarily set by authority. Where the supervised-study portion of the period precedes the recitation portion, the assignment may conveniently be made at the beginning of the period. This procedure operates to reduce the loss that results from having an interval of a day between assignment and study. The student then begins study with the problem — tasks, questions, helps, hints, and suggestions fresh in mind — and interest in it probably keener by reason of the opening introduction by the teacher. On the other hand, as previously noted, such a procedure is likely to all but abolish home study, and often assignments might best be prepared if some time were spent on them elsewhere than in the recitation room. To offset this at least partially, however, is the assurance that the teacher has that the student's work is his own, having been done under supervision.

Quite frequently teachers will not wish to make daily assignments, but will set out the work to be accomplished in larger units than daily lessons, for example, contracts, challenges, problems, or projects. Often when such larger unit tasks are employed the entire class period may be devoted to "assignment."

5. Class management in the supervised-study period

Preparatory steps. There are some things which should be attended to before the actual study is commenced. Care must be taken that all the materials needed for study are handy, such as dictionaries, drawing boards and equipment, maps, atlases, and perhaps a departmental library. The teacher should see to it that all supplementary and reference books to be used for the day are brought into the room in advance, and placed at the disposal of the students. Each recitation room should contain some sort of adequate

dictionary, preferably an unabridged one. Students should be trained in the routine of bringing with them pen, pencil, paper, notebook, textbook, cards, and any other material likely to be needed. Many teachers permit five to ten minutes to be wasted each day by the apparent necessity of students going to lockers or elsewhere for supplies of some sort. That this is largely a matter of habit and can be prevented is shown by the fact that many teachers have been able to reduce the amount of this confusion to only a fraction of what others permit every day.

Distractions. Often the seating arrangement will be a factor in determining the success of the supervised-study period. The chances of distraction caused by conversations, note-writing, and horse-play are certain to be increased if close friends are grouped together. Some arbitrary seating plan, such as an alphabetical arrangement, put into effect early in the course, operates to remove temptations to engage in this type of distraction. At the outset care should be taken to see that the room is of a comfortable temperature, that the air is fairly fresh, and that the blinds are so arranged that if possible, satisfactory light is available for every pupil in the room. Discomfort resulting from faulty management in these respects constitutes distractions that are certain to decrease the effectiveness of study.

The worst sort of distraction to study, however, whether at school or at home, is conversation. Teachers should never converse aloud with pupils in the room. It is unwise to attempt to "supervise study" across the room, or to correct pupils so that others may hear. The teacher should go quietly to the seat of the pupil and carry on any needed conversation in a tone so low as not to disturb others. Every precaution should be taken so to shape conditions as to contribute to an atmosphere of study and quiet.

Mistakes in management. One of the chief sources of

difficulty in realizing the possibilities of supervised study lies in the inability of teachers effectively to direct the work of the students during the supervised-study section of the class period. That this situation exists is largely due to one or both of two reasons. Either the teacher has not learned the technique of supervising study, or he feels it desirable to economize time by using the supervised-study period for other purposes, such as marking papers, preparing records or reports, looking over future lessons, and in some instances, sad but true, for attending to correspondence or doing errands. Certain enterprising teachers have conceived of the period as an opportunity to give social training by leaving the class in charge of the students or their delegated representatives.

Other teachers take the responsibility of supervision more seriously, but hardly more intelligently. They conduct small study halls from the front of the room. Those students who are ambitious and energetic enough to do so are permitted to bring their troubles to the teacher's desk. Often the student who needs attention most will be most unlikely to seek the teacher, but must instead be approached by him.

The right way. The modern conception of a real teacher is as a director of study, and not as a supervisor of study or an inspector of the results of study. Not the detection of errors but the prevention of them is what is desired. The important task of the modern teacher may be said to be that of directing study — the laying out, planning for, stimulating, motivating, guiding, training for, encouraging, assisting, diagnosing, and measuring study. To be a director of study involves more than making one's self available to be resorted to in times of need by those who will. Too often those who come for help are those who need help least — keen but lazy pupils. Best results are obtained by those teachers

who work among the pupils at their desks, choosing in most instances whom they will help rather than merely responding to those who apply, though to be sure the teacher will in general be available to those who seek him. A good share of his efforts will be spent with those whom he knows need him — weak students, absentees, those having special difficulties, bright students needing special work, discouraged students — even though they make no application for assistance. It is indeed a point in the technique and skill of the teacher who would direct the study of pupils to be able to apportion his or her efforts most advantageously. To a certain extent this apportionment must be planned ahead. Frequently, if not daily, the instructor will canvass the progress of the individuals of the class, make at least mental note of those who obviously are in need of special help, and see to it that these are visited during the following study period. Many times he will have to pretend not to see hands or other indications of a desire for help, both for the sake of the individuals asking for counsel and those on his visiting list for the day.

Equipment for the supervision of study. The first task of the teacher who would serve young people in supervising or directing study is to acquaint himself thoroughly with what is known about the technique of learning and studying. In fact, the teacher who would be well trained for teaching must be rather well trained in certain phases of applied psychology — that is, the psychology of human learning. Lacking that, the teacher should at least give considerable attention to certain books which attempt to sum up the psychology and pedagogy of learning. A number of good books of this type are given in the list of references at the close of this chapter.

The teacher should also know rather well the literature of general methods of study. He should have read and

mastered a few such books in this field as Kitson's *How to Use Your Mind*, Thomas's *Training for Effective Study*, Hall-Quest's *Supervised Study*, Kornhauser's *How to Study*, and Lyman's *The Mind at Work*. He should also have kept thoroughly abreast of the field of special method in the subjects he teaches. For example, the teacher of English should have read thoroughly at least a few such books as Thomas's *Teaching of English in the Secondary School*, McGregor's *Supervising the Study of English*, the Report of the Committee on English of the Commission on the Reorganization of Secondary Education. He should also keep in touch with the periodical literature relating to the teaching of English.

Above all is it necessary for every teacher to understand the purpose and function of the subject-matter used in the schools. No intelligent supervision can take place unless the supervisor knows and has in mind the purposes for which the subject-matter which he teaches is taught. Teachers should, much more than is usually the case now, know the exact aims of their subjects, and keep these ever before them. A teacher should examine each unit of subject-matter, and determine what contribution to these aims it may have to make. Teaching methods, assignments, and supervised-study methods depend upon aims. Subject-matter should be so organized, so taught, and so learned, that it may realize its possibilities most completely in contributing to the realization of the objectives of the school. We cannot take space to carry this point further, but it is certain that supervised study can be done efficiently only by those teachers who possess perspective, and who have come to see subject-matter as tools and means toward larger ends and not as the goals of education.

In short, the teacher when acting as a study director should:

1. Know the principal laws of learning and the psychology of acquiring information, habits, skills, ideals, and attitudes, as far as it is possible for these to be known.
2. Be thoroughly versed in methods of study, and the general technique of the supervision of study.
3. Have mastered completely the special methods of teaching his particular subject or subjects.
4. Possess a clear idea of the educational functions of the subject he teaches.

Preserving self-reliance. It is often objected that supervised study tends to weaken self-reliance, as students tend to lean on the instructor rather than carry on independent study. This objection must not be regarded lightly. It requires much judgment to decide just what amount of assistance should be given to this pupil, and how much to that. It requires quick thinking and an excellent choice of words and expression to be able to give that assistance clearly, and without giving more than is necessary or desirable. It requires firmness of character to decline to assist students beyond the point where it seems that they ought to be able to help themselves. It requires diplomacy to be able to decline to give further help without impairing the attitude of the student. The most successful directors of study learn early that education is an individual matter, even though conducted on a group basis, and that the type and amount of help given in the study hour must be varied from student to student.

A number of factors is involved in deciding just what amount of assistance it is desirable to give. The guiding principle is to give just that amount of assistance which, with a reasonable amount of effort on the part of the pupil, will enable him to carry the work forward. Help beyond this point operates to deny the pupil the opportunity for that exercise of the powers of mind which is fundamental to their development. It is interesting to watch skillful and

experienced teachers, while parrying efforts to pump them, stimulate a pupil to effort with questions and suggestions which do not tell, but which provoke the pupil to think of that which he needs for further progress. It is interesting, too, to watch such a teacher guide a student, leading him but not carrying him through thought processes which are not only of assistance in the task of the immediate moment, but which will stand him in hand in future and similar difficulties.

Socratic questioning. Skillful teachers make much use of questioning. More often than not the student's first question or statement of difficulty is met with a question in return. A succession of questions often stimulates the pupil to call to mind those ideas which form an apperceptive setting, and from which he can derive conclusions which lead him to the solution of his problem. Very often this process may well take the form of Socratic questioning.

The author recalls a situation which quite aptly illustrates good technique in this respect. A freshman English class was engaged in writing friendly letters. A pupil was undecided as to whether to write "A group of boys has organized a Hi-Y club," or "A group of boys have organized a Hi-Y club." The teacher in charge had as possible alternatives to tell outright, to refuse to aid at all by saying "you ought to know that," to refer the pupil to his textbook, and to encourage the pupil to attack his problem and help guide him to an hypothesis. The pupil's appeal for aid was, "Would you use *has organized* or *have organized*?" The teacher's reply was, "When does one use *has organized*, and when does one say *have organized*?" The question-and-answer helping then continued about as follows:

Pupil — "Why — you say *has* when it's one, and *have* when it's more than one."

Teacher — "When what is one?"

Pupil — "Why — what you are talking about — the subject."

Teacher — "What is the subject here?"

Pupil — "A group of us boys — that's what I was talking about."

Teacher — "Yes, that's true — but look at what you have written there. What is the simple subject?"

Pupil — "I guess I don't know if it isn't us boys."

Teacher — "Don't you remember that there are two kinds of subjects — complete subjects and simple subjects?"

Pupil — "Oh, yes, I guess group is the simple subject."

Teacher — "Well, is group singular or —"

Pupil — "Oh, I see, but say, it does look at first like you —"

Teacher — "Like?"

Pupil — "As if us boys was the subject, and you ought to say 'have,' doesn't it?"

Teacher — "It certainly does — unless you have developed the habit of looking up the simple subject to see what number it is."

Another pupil in the same class raised a similar question, and was told to look at his sentence again. I wondered why, and asked. "That's all he needed," I was informed. "He has to be made to think for himself. He's bright, but is naturally a leaner."

In many instances the work of the teacher is quite similar to that in assisting in problem-solving. The work may do:

1. Locate the difficulty; that is, to define the problem.
2. Analyze the problem, for suggestions as to procedure.
3. Stimulate a pupil to hit upon possible solutions.
4. Stimulate a pupil to critical consideration of possible solutions, by:
 - a. Application and verification.
 - b. *Reductio ad absurdum*.

For the supervision of study, the teacher needs to be skilled in procedures of this type. As a more detailed discussion of the problem-solving process will be given in a later chapter, the technique will not be considered here.

Individual differences and supervised study. In the foregoing discussion, much has been said which should throw light on how individual differences should be handled, in so far as they result in the need for varying amounts of help. Individual help is a saving of time for most pupils, and is usually taken to heart more seriously than is any class explanation. The supervised-study time will permit of special help being given to the slow, the weak, and the discouraged child. It will make possible the individual attention such pupils need.

Although as actually administered, supervised study has seemed to improve the quality of work of the slower students more than that of the brighter ones, such a condition may not be regarded as either normal or desirable. Bright students need less recitation work and more time for study. The supervised-study period should be, and often is, used as a time for interesting these brighter students in extra work. Extra assignments, individual or group, often are given at this time. Sometimes very bright students, working independently of the class, have their conferences with the teacher at this time. Supervised study should be made to administer to the needs of the bright pupil, as well as to those of the slow one.

The absentee and the transfer pupil. Use should be made of the study period in rehabilitating the pupil just returned from absence. Make-up work under the old plan has never been satisfactorily administered. In the traditional recitation there is no time to make assignments over the work missed, nor to check work done on them when made. Not only can these things be taken care of in the study period, but, where necessary, some instruction and explanation of the back work may be given. Students returning after an absence of several days or more not only are really somewhat behind, and unable to go on satis-

factorily with their class, but often they work under the handicap of a strong inferiority complex. Everything seems strange, and they are confused. A little individual instruction will go a long way to clearing up this unfortunate attitude, which otherwise will be a material handicap to good work.

The same services can be rendered for the student who is a transfer from another school. It is the usual thing for the work to be somewhat different from that in the school from which he has transferred. New texts are used, and a new teacher and new methods are to be adjusted to. Often actual gaps in a continuous type of subject-matter, such as mathematics, occur. The study period should be used to administer to the needs of these pupils. What form this special help should take depends upon the nature of the subject-matter and the ability of the pupil to work independently. In the case of transfers, some test to discover weaknesses is advisable. For most cases the "make-up" should take the form of small daily extra assignments over the minimum essentials of the work missed, or over the weak spots. Often it is advisable to set up a definite goal by promising the pupil a test of the work made up at the conclusion of the special work.

Studying other subjects. One of the first problems met with in supervised-study periods is the pupil who wishes to prepare for the next hour, rather than study the subject in which he has just finished reciting. It is quite possible that such study will be done with concentration of attention, and it is difficult to refuse pupils who insist that they understand the work to be done in the class for which they are supposed to study, or that they will prepare the work at home or in study hall. Yet it is unwise to yield to such requests. A general rule should be laid down on this point, and uniformly adhered to. If such permission is given, students will come

to rely upon it, leaving the preparation of classes until the supervised-study time of the class just preceding. That is distinctly bad training for the pupil, and certain to result in inadequate preparation. If students are to be permitted to prepare the work of other classes during the supervised-study periods, supervised study would have no advantage over study-hall study, and could be handled much more economically in that fashion.

Revised assignments and class helps. As noted previously in this discussion, it will occasionally be necessary to shorten or lengthen the assignment as made at the beginning of the study period. Some teachers, chiefly teachers of mathematics and foreign languages, have found it useful to set the exact amount of work to be done at the close of the hour, after the class has been at work upon new material during the study period. The study period is thus regarded as an extension of and try-out for the assignment. It has the value at least of obviating the necessity of reducing the assignment after the study period, or if necessary of increasing it, in order that the class members may make maximum progress in the time at their disposal. This latter type of assignment revision is of doubtful value. It does not place a value upon a maximum rate in the study period, and is accepted gracefully only by students who are dominated by a desire to make as much progress as possible during the term, semester, or year. It is characteristic of young people to work more energetically and cheerfully when definite goals are fixed, and once set, their sense of fair play demands that these be observed.

Be the assignment prepared as thoughtfully as it may, there will occasionally arise the need for supplementing it. Indeed, this may be said to be one of the values of the supervised-study periods, namely, that hints, suggestions, and directions may be given the class which did not occur

to the instructor when preparing the class for the advance work, or which did not at the time seem necessary. While supplementing should be kept at a minimum, it will occasionally be wise to call for the attention of the class while further explanation or directions are given. The same point or question should not be raised by any large number of individual pupils, as economy of time forbids going over the same ground with each of them.

Group study. In the foregoing we have been considering only the "silent," or "individual" type of supervised study. It is quite likely that in many instances the silent type is preferable. Group study does not lend itself so well to the taking care of individual differences, or to the establishment of personal relationships and contacts. Yet there are times when group study can be carried on to better advantage. Often history students can be taught, as a class, how to get the most out of a history lesson, or how to outline, organize, and summarize. Often group study of history, and the resulting discussions that take place, tend to generate interest which would not result from silent study. In the study of foreign languages, too, a class can be taught how to translate as a group. Sight translation may be carried on as a type of supervised study.

Often it is wise to permit students to study together in small groups. The writer knows of one teacher who organizes her class in second-year Latin into three or four groups, and sometimes into five or six. The groups are formed according to their ability, and they progress at their own rate. The teacher spends the entire hour in supervising the study of the various groups, though devoting most attention to the slower ones. Occasionally a pupil is shifted from one group to another. This, however, should seldom be done. At the close of a six-weeks unit of work the group comes up for examination, regardless of how long they have spent on

the unit. Final grades are based on the quality of work done as shown by these examinations, and by the amount covered. Sometimes a group is sent back for a review of a portion of the work, after which it takes the examination again. A responsibility is thus generated that is not typical of the traditional class exercise.

Other teachers divide their students into groups for study, with the most capable students as group leaders. Others permit students to form volunteer groups for study. Because of the temptation to think and talk of things other than the work of the class, and the doubtful value of much of this type of mutual help, these ventures are not always successful.

Establishing favorable relations. One of the valuable features of the supervised study is the opportunity that is afforded for personal and individual relations between pupil and teacher. One of the most unfortunate features of the usual class teaching is the "class *vs.* teacher" attitude that is so often generated. The teacher's contact with the pupil is confined largely to the recitation, where the teacher appears in the rôle of a taskmaster and an inspector. It is quite natural that such an attitude should be present in incipient form so long as school work is less attractive to young people than other things which they might be doing, or at least than they seem to young people. The nature of the situation tends to develop that attitude. It is the characteristic response of men when congregated under conditions of fellowship and in restriction. College students, soldiers, lumberjacks, and consumers of alcoholic drink all develop sympathetic defense attitudes toward the common enemy — professors, superior officers, foremen and cooks, and those who enforce the liquor laws, as the case may be.

In the supervised-study period there is the opportunity for setting a back-fire to this unwholesome attitude. The teacher should now be regarded as a coach, as a helper, as a

counselor, and as a leader. Qualities of sympathy and helpfulness should be evidenced. There should be created the atmosphere in the supervised-study period of working together for a common objective. The task of study should come to be regarded as an impersonal objective one — the mastery of educational goals as opposed to the mere satisfaction of teacher-imposed standards. Work done in this frame of mind is certain to be of a higher order, to say nothing of the value and satisfaction derived from the more pleasant relationships.

The possibilities in this direction should not be neglected. The stimulating influence of personal interest with many pupils is more effective than clear presentation of subject-matter. It is not an unusual occurrence for youngsters, stimulated to unusual effort by the personal interest or personality of a particular teacher, to become aware of their possibilities and to take a wholly different attitude toward their own ability and the subject under study. One of the outstanding causes of dissatisfaction with school work, and of a listless attitude toward it, is the lack of ability to make satisfactory progress in the subject. This is a quite general human characteristic, and it is an operation of the *law of effect*. Once convinced that the "inability" is an illusion, students are quite likely to find the subject-matter much more interesting, and class work much more worth doing. Little friendships may be established which often are of incalculable value to students, and occasionally are revolutionary influences in their lives, inspiring ideals and awakening desires to live up to good opinion. These are of great value, and in turn not only give to the true teacher a keen satisfaction of service, but are not without practical value in class control and management. The author has known of a number of principals whose influence in their respective schools was due in part to numerous wholesome

friendships with pupils, and he has witnessed a number of times the strategy of practice teachers in securing, in a subtle manner, the good will of "key" pupils in their respective classes. It is probably obvious that this sort of thing must be done with considerable caution and finesse. Bold bids for popularity and "good fellowship" are many times the beginning of the end for certain types of self-styled "democratic" teachers.

Studying pupils. At this time, too, the teacher must make good the opportunity to study the working of the pupils' minds. One of the reasons why students do not learn when teachers teach, is because teachers do not understand the difficulties and the mental processes of the students in their classes. Particularly are recent college graduates, of excellent scholarship, quite lacking in appreciation of all the possible difficulties and pitfalls experienced by mediocre high school freshmen. They do not remove difficulties because they do not realize that they are there. Because of superior scholarship and maturity their thinking is done in larger units. They use college methods with little adaptation which, even though we assume that college methods are worthy of emulation, are ill-adapted psychologically for comparatively unselected adolescent youngsters.

The teacher as a study director, then, should utilize the opportunity to work with individuals and to watch them think. Such observation will afford him excellent training in the psychology of thinking. It is truly experimental, "behavioristic," and applied. A check-up on the effectiveness of the class teaching should be had through these personal contacts.

Desirable human qualities. Directing the efforts of a group of human beings requires something more than intellectual information and teaching technique, however indispensable these may be. The successful study director

must be a keen student of human motives and character. He must understand the frailties of young people well enough to be on guard against them. He must not be "worked." Still, he must be always conscious that frailties are natural and are to be expected. He must be firm but patient. He must be superior to petty irritation. A "big" attitude toward the "small" tricks of young people is a more likely cure than more direct punishment. It tends to generate a like "bigness" in pupils. It is a certain source of satisfaction to the instructor, in addition to its wholesome effect upon his whole mental and physical tone.

He must have sensible sympathy, and must not engage in a weakening, sentimental nursing and "mothering." He needs to have a good sense of humor. He must have a quiet, forceful, pleasant dignity. All these qualities are necessary to the establishment of confidence, leadership, good will, and respect, without which the supervision of study is likely to be very ineffective in results.

6. Supervised study and other types of class management

Supervised study not necessarily an alternative to other methods. The mistake is sometimes made of attempting to think of supervised study as being completely different from other general types of class-management procedure. Teachers permit themselves to be puzzled as to what are the distinctive differences between supervised study and the socialized recitation, or supervised study and problem-project methods. It is not wise or accurate to regard supervised study and these other forms for promoting educational activity on the part of the pupils as alternative procedures. Socialized class procedure, project teaching, and supervised study may be carried on at one and the same time in any class. When pupils are engaged in the solution or completion of problems or projects under the supervision of

the instructor, "supervised study" exists. Socialized class procedure may be employed quite frequently in class study under teacher supervision. In fact, some writers and teachers have employed the words "supervised study," or "directed study," in a sense which would apply to all the learning activity of the pupil stimulated by the teacher — necessarily then including socialized class procedure and problem-project work, as well as all other teaching or learning activity.

The distinguishing idea of supervised study is the provision for more careful guidance and training in learning methods and self-activity. The fundamental idea of supervised study is the relative emphasis of this function or phase of teaching, as compared with the emphasis previously placed upon the lesson-hearing and assigning activities of the teacher.

Supervising the study of pupils without special supervised-study organization. While a special organization of the school day involving a longer class period is desirable as a favorable condition for carrying on supervised study, much can be done, without any special adjustment of the class periods, toward meeting the spirit of supervised study and realizing to a degree its possible benefits. In those instances where the teacher has conceived of his task and opportunity as being very largely that of assistant, coach, and trainer of young people in study, and has familiarized himself with the theory and art of study and learning methods, much improvement over the old procedure can be effected.

Even in a traditional forty-five or fifty-minute class period, if the teacher is successful in centering his class upon progress in the subject or the completion of large units of it, and thereby obviates the apparent necessity of daily lesson-hearing, much time can be found for supervising the study of pupils. There is little question but that much less re-

sponsibility for checking up on pupils as a goal to study should be shouldered by the teacher, and that much more responsibility for progress can be shifted to the pupil than has been the case in the past. The logical conclusion of this statement is that a portion of the time now spent in reciting may profitably be spent in study. The success of the Dalton plan of individual learning, where practically no time is employed in "reciting," lends weight to this idea.

In any class, under almost any conditions, training in study methods can be provided for. Occasional study days, when advanced work is substituted for recitation may be employed where no other form of supervised study is provided for. In these days a history lesson may be outlined, or organized and learned; a page or so of Latin or other foreign language may be translated in class; practice may be given in solving "story" problems in algebra; or other activities may be carried on which will furnish opportunity for instruction, and for practice in acquiring skill in methods of study. Students may also be given formal instruction in methods of study, hints on how to use reference books, and suggestions as to how to study, how to memorize, and how to study the special subjects. This may be done orally by the teacher, or by giving out printed lists of suggestions.

7. Supervised study and laboratory teaching

Supervised study in the laboratory, commercial and art rooms, and the shop. The supervised-study idea is not new to certain high school departments. Laboratory work, shop work, and work done in the cooking, serving, and sewing rooms in properly organized and managed home economics departments constitute excellent examples of supervised study. The teacher of commercial subjects and his students spend much of their time in supervised study, and

the same may be said for the teachers and pupils in the departments of music and art. In these subjects, particularly when manual skills are being developed, the desirability of provision for study and practice under supervision became apparent much earlier than in the academic subjects emphasizing the acquisition of information and mental skills. In these departments, the double period twice or three times a week for supervised study, usually referred to as laboratory work, has become traditional.

Supervised study as carried on in the laboratory and the shop has always suggested possibilities to the teacher of non-laboratory subjects. Even before the rapid development of supervised study, beginning a decade ago, there had been much talk of the "laboratory" plan of teaching English or mathematics, and occasionally the idea was also applied to history. What was contemplated was nothing more than the study and practice by the pupil under the supervision of the teacher.

Supervised study here of two types; drill and problem-solving. Good laboratory supervision is nothing more than intelligent and skillful supervision of study, plus the special technique in the particular type of laboratory or shop. Laboratory work in sciences, art, and home economics classes, and shop work in vocational subjects, are usually of the problem-project type of study. In earlier days the work done in these subjects was, at least in part, formal drill work for the purpose of acquiring desired general elementary skills with tools, or the mastering of fundamental skills, such as the making of certain stitches, making joints, etc. In the modern shop the work now usually centers around a carefully selected series of problems or projects, and in the modern laboratory the work consists of the solution of a series of problems or experiments.

In the commercial rooms much the same situations obtain.

Supervised study here consists of two types of learning activity — the perfection of skills directly, such as is the case in the typing and shorthand drill and practice; or the solution of problems or the completion of projects, as in the case of the completion of a set of artificial or actual accounts in bookkeeping, or in the taking over of actual responsibilities as stenographer or clerical help in the school office or elsewhere.

What has been said of the industrial and home-making work, and of the activity of the commercial practice periods, may also be said of the laboratory work, in the department of art, namely, that it is of two types of learning activity — the acquisition of skills directly, or of work upon projects and problems.

What is needed, then, for the efficient supervision of these types of supervised study is: first, a thorough mastery of modern special method in the special subject, including laboratory and shop management; and second, a knowledge and mastery of the technique of assisting pupils to acquire skills, including the technique of the drill lesson and the technique of assisting pupils in problem-solving and supervising-project work. The technique of assisting pupils to acquire skills will be discussed in the following chapter, while Chapters XIII and XIV will be devoted to problem and project teaching.

Special suggestions on laboratory supervised study. While all laboratory and shop work, as carried on in many instances, after all is supervised study, it does not always conform to the standards of the best technique. Particularly questionable is the plan so often used in science instruction of having a parallel course in laboratory work, in which the "experiments" are carried on almost independently of the class lecture and discussion work. Until within the last few years the most common practice was to

set for the pupils a series of formal laboratory exercises, calculated to develop skill in laboratory technique, and to develop experimentally many of the more important generalizations of the subject. Because of the limited supply of laboratory apparatus, different groups of students worked in different experiments and the apparatus was rotated. As a consequence some experiments were performed after the conclusions from them had already been learned in the regular class work, and others were performed before proper introduction to them had been made in class. Many students saw little or no connection between the laboratory work and the other work of the course, and the experiments were performed as a series of puzzles or hurdles prerequisite to passing in the work. Results were copied, juggled, and treated in any way to get "correct" results. A few leaders did all the work, discipline was not always easy, and much of the time was worse than wasted.

The modern procedure, at least for the high school, contemplates that most of the laboratory work will grow out of and parallel the work of the class. The problems are largely those arising in the class work. Many experiments are carried on in the spirit of the outside report. Much more use is made of skillful demonstration experiments by the teacher. Socialized procedure, in the form of student or group demonstrations and reports, is employed. Individual and group projects are carried on in the laboratory. The attitude of the student toward this latter type of activity is quite different from that which characterized the formal experiment plan. Instead of a set of predetermined exercises, the series of projects is determined partly by the special interests and abilities of members of the class, and often these are self-proposed. The modern skillful high school laboratory instructor is thoroughly familiar with project procedure, and handles it with an admirable technique.

What has been said in the foregoing paragraphs applies with equal force to new and modern supervision of art and home economics laboratories. In these departments even more importance is attached to the project approach. Instead of projects paralleling the regular class work, the projects are the regular class work, and the book and discussion actively supplement and aid in the completion of the projects.

Having devoted this chapter to the need for supervising the study of pupils, plans for handling supervised study, and the management of such work by the teacher in charge, we shall next take up the problem of teaching pupils *how* to study. This is as important for the teacher to know as is how to handle the class-management end of such instruction which we have just described.

QUESTIONS AND EXERCISES

1. Do you think that doing away with home study would be desirable? Give reasons for your answer, and arguments against it.
2. To what extent do you believe the indictments charged against home study are true?
3. Barring the items of expense, and the longer school day required, which do you think the better plan for supervised study, the double-period or the divided-period plan? Why?
4. Be able to describe all the plans for supervised study mentioned in the chapter.
5. Of the functions for supervised study mentioned, which do you think the most important and practical, and which the least?
6. What is your own reaction to the objectives for supervised study? What suggestions as to technique can you list to avoid or overcome these objections?
7. Think out the possible advantages and limitations of a system of supervised study, in your subject of specialization.
8. Realizing that many teachers will permit recitation activity in the class period to encroach upon the time supposed to be spent on preparation of work, would it be wise to have a gong sounded at the middle of the period, at which time the recitation should be brought to a close?

9. Make a list of ten "Don'ts" for supervising study.
10. In what way would the use of supervised study add to the effectiveness of teaching with your subject?
11. Would the group or the individual silent type of work be best adapted to your plan?
12. Make a list of five suggestions, not mentioned in the chapter, for the technique of conducting supervised study.

SELECTED REFERENCES

I. General references.

- Breslich, E. R. *Supervised Study as a Means of Providing Supplementary Individual Instruction*. 13th Yearbook of the National Society for the Study of Education. 1914.
Pp. 32-73. A comprehensive discussion of supervised study up to that time.
- Breslich, E. R. "Teaching High School Pupils to Study"; in *School Review*, vol. 20, pp. 505-15. (October, 1912.)
- Carter, Ralph E. "Teaching a Study of Habit"; in *School Review*, vol. 29, pp. 695-706 and 761-75. (November and December, 1921.)
- Colvin, S. S. *An Introduction to High School Teaching*. New York: The Macmillan Co., 1919.
Chapter XVII, "Supervised Study." Brief practical discussion of needs, forms, and technique of supervised study.
- Cunningham, Harry G. "Teaching How to Study"; in *School Review*, vol. 33, pp. 355-62. (May, 1925.)
- Hall-Quest, Alfred L. "How to Introduce Supervised Study"; in *School Review*, vol. 26, pp. 337-40. (May, 1918.)
- Hall-Quest, Alfred L. *Supervised Study*. New York: The Macmillan Co., 1917.
Pp. 484. Most complete discussion of supervised study.
- Hall-Quest, Alfred L. Chapter IX in the *Modern High School*, Charles H. Johnson, Editor. New York: Charles Scribner's Sons, 1914.
- Holley, C. E. *The Teacher's Technique*. New York: The Century Co., 1922.
Pp. 227-43. Suggestions and devices for supervising pupil study.
- Merriman, E. D. "Technique of Supervised Study"; in *School Review*, vol. 26, pp. 35-38. (January, 1918.)
Concise, well-organized statement of suggestions on how to conduct supervised study.

Miller, H. L. *Directing Study*. New York: Charles Scribner's Sons, 1922.

Chapter II, "The Administration of Directing Study." Very interesting and stimulating.

Nutt, W. H. *The Principles of Teaching High School Pupils*. New York: The Century Co., 1922.

Chapter X, "Supervision of the Study Habits of High School Pupils." Discusses assisting students to acquire more technique of study.

Parker, Samuel C. *Method of Teaching in High School*. New York: Ginn & Co., 1915. (Revised, 1921.)

Chapter XVI, a short discussion containing suggestions for supervising study.

Peckstein, L. A., and McGregor, A. L. *Psychology of the Junior High School Pupil*. Boston: Houghton Mifflin Co., 1924.

Chapter XIII, "Supervised Study." Brief but good.

Reavis, W. C. "Importance of a Study Program for High School Pupils"; in *School Review*, vol. 19, pp. 398-405. (May, 1911.)

Rynearson, E. "The Conference Hour in a Pittsburgh High School"; in *School Review*, vol. 20, pp. 246-53. (April, 1912.)

Description of the use of the unassigned lesson hour in various high school subjects.

Spencer, P. R. "A Study Day"; in *School Review*, vol. 33, pp. 444-49. (June, 1925.)

Describes the use of one day each week for study — no recitations or regular classes.

Thomas, Frank W. *Training for Effective Study*. Houghton Mifflin Co., 1922. 246 pp.

An excellent and practical treatment. Includes excellent discussions of motivation of study, effective methods of study and supervision of study.

Van Denberg, Jos. K. *The Junior High School Idea*. Henry Holt & Co., 1922.

Chapter XIII, "Teaching Pupils to Study Alone." Adjustment of assignments to time and opportunity of class.

Willet, G. W. "Supervised Study in the High School"; in *School Review*, vol. 26, pp. 259-66. (April, 1918.)

Good description of the plans of supervised study as in operation in a number of high schools. Advantages and objections given.

Young, E., and Simpson, M. E. "Technique for the Lengthened Period"; in *School Review*, vol. 30, pp. 199-204. (March, 1922.)

Concise description of the technique employed in the Bucyrus, Ohio, High School.

2. For special subjects.

Beaucamp, W. L. "Supervised Study in Elementary Physical Science"; in *School Review*, vol. 32, pp. 175-81. (March, 1924.)

Breslich, E. R. "Supervised Study of Mathematics"; in *School Review*, vol. 31, pp. 733-47. (December, 1923.)

Hall-Quest, A. L. *Supervised Study*. New York: The Macmillan Co., 1917.

Part II contains chapters on supervised study in English, history, mathematics, civics, and languages.

Hanes, E. "Supervised Study of English"; in *School Review*, vol. 37, pp. 356-63. (May, 1924.)

Handschin, Charles H. *Methods of Teaching Modern Languages*, pp. 270-85. Yonkers, New York: World Book Company, 1923.

Heckert, J. W. "The Effects of Supervised Study in English Composition"; in *Journal of Educational Research*, vol. 5, pp. 368-80. (December, 1922.) Bibliography.

McGregor, A. L. *Supervised Study in English*. New York: The Macmillan Co., 1921. 220 pp.

Minnick, John. "An Experiment in the Supervised Study of Mathematics"; in *School Review*, vol. 21, pp. 670-75. (December, 1913.)

Morse, K. "An Experiment in the Supervised Study"; in *English Journal*, vol. 8, pp. 355-64. (June, 1919.)

Pieper, C. J. "Supervised Study in Natural Science"; in *School Review*, vol. 32, pp. 122-33. (February, 1924.)

Rugg, Earle U. "Supervised Study in History"; in *Historical Outlook*, vol. 11, pp. 142-49. (April, 1920.)

Simpson, Mabel E. *Supervised Study in History*. New York: The Macmillan Co., 1918. 278 pp.

Especially helpful illustrative lesson plans.

Sumner, S. C. *Supervised Study in Mathematics and Science*. New York: The Macmillan Co., 1922. 241 pp.

Tryon, Rolla M. *The Teaching of History*. Ginn & Co., 1921. 294 pp.

Chapter II, "Teaching Pupils to Study History."

Wilkins, L. A. *Spanish in the High School*. New York: Benjamin E. Sanborn, 1918.

Pp. 117-22 and 152-56, supervising the study of Spanish.

CHAPTER V

TEACHING YOUNG PEOPLE HOW TO STUDY

Importance of knowing what and how to study: The real function of the teacher — Five important types of training for study.

1. *Teaching how to retain facts and ideas:* Verbatim memorizing — Whole and part methods in memorizing — Learning the gist of things — Learning unit associations — Importance of first impressions — Necessity of attention in repetitions — Necessity of early recall and use — Importance of association in learning — Use of various memory devices — Importance of avoiding incorrect repetitions.
2. *Teaching how to use books:* Reading as a study activity — Teaching pupils to read — Learning to read with thoroughness — Taking notes on reading — Learning to read rapidly — Building habits of reference — The use of reference works.
3. *Teaching pupils to study for appreciation and enjoyment:* Technique of teaching study for appreciation — Supervising study for appreciation in the study period — Providing opportunity for expression.
4. *Other types of training for study:* The study program — Information about methods of study — Suggestions for special subjects — Helping pupils acquire skills and motor control — Suggestions as to drills for skill or habit formation — Teaching pupils to solve problems.

Questions and exercises — Selected references.

Importance of knowing what and how to study. Do you remember who the Plantagenets were, or when they lived? What is the significance of the date 1066? What is the accusative singular form of the Latin noun meaning "army"? What is Boyle's Law? What are the chief manufactured products of Dayton, Ohio? What is the binomial theorem? Who were the three suitors of Portia in the *Merchant of Venice*? What is the order of succession to the Presidency of the United States?

Barring questions in subjects which you have taught, how many such questions can you answer correctly? How many such facts do you really need to know? By way of contrast with such questions, consider instruction which

teaches pupils how to find out things for themselves. Consider the following practical and important questions of everyday life. How would you carry on an investigation to find out whether your tax bill is correct, or not? How would you determine whether it is cheaper to pay rent, or to own your own home? How could you find out whether corn can be grown successfully in your State, or not? How would you make certain repairs to an automobile? How did we come to have the Monroe Doctrine? What is needed to solve problems of this sort — ready recall of information, or skill in the technique of thinking and study?

One of the most important services that education can render, after literacy and some use of the fundamental tools have been attained, is that of developing in young people skill in solving the problems of life. It is ridiculous to hope that the school may ever equip people with any considerable portion of the information needed for solving all the practical questions of the home, business, industry, politics, and the farm. Instead the school should spend its best efforts in giving to its students the skills necessary to enable them to think through problems to satisfactory solutions, and the ability to acquire information and added skills as they are needed. The ultimate goal of the teacher and the school is to so train pupils for independent study as to make both the teacher and the school unnecessary.

The real function of the teacher. The teacher, then, must regard himself as a trainer of young people in the art of study, learning, and thinking, as well as, or perhaps rather than as, a drillmaster and imparter of information. It is somewhat singular that, although the chief business of students in school is learning and study, so little has been done directly or formally to teach them how to learn or how to study.

There are a number of reasons why this has for long been

so. One, no doubt, is that our teachers have until recently centered on information as the main educational objective. Another, no doubt, is that teachers have set apart no time for teaching their pupils how to study, but have been busy all day with hearing pupils recite the lessons they have learned out of class. Perhaps the most significant factor, though, particularly in the case of college-trained teachers in our high schools, has been the fact that they have not known how to teach their pupils how to study. They themselves learned how to study largely by "brute force and general awkwardness," and, lacking training in college in the theory of teaching, they have learned how to study by trial-and-error methods. Their fellows, who did not survive the high school and college, probably tried less or erred more.

Perhaps we may say that those who learned to study effectively were simply brighter, or more fortunate in hitting upon the right methods, or both. That sort of an arrangement, though, is too wasteful, and we need to devise better methods and instruction that will lead to better results. We know now that at least a third of the time spent by an average boy of twelve to fourteen years of age in trying to learn a hard lesson out of a book is time and energy wasted, and that such "study" makes for bad habits of work. The art of studying should be taught to young people, that the time now squandered may be saved and used to better advantage. There are a number of aspects of the process of training pupils how to study which are of importance to the teacher, and which we shall consider, in order.

Five important types of training for study. There are five important types of study — memory work, the use of books as tools, study for appreciation or enjoyment, the acquisition of skills, and problem-solving — which are of importance to us in any consideration of methods for teach-

ing young people how to study. We shall devote the present chapter to a brief consideration of these different types.

1. Teaching how to retain facts and ideas

Much stress, perhaps too much, in school work has always been placed on memory work. Yet, naturally, a certain amount of memory work in schools always will be necessary, and different types of memory work are required by the school. Chief among these are verbatim memorizing; memory of the general gist and meaning of material; and unit associations. It is useful to bear these distinctions in mind in considering teaching procedure. We shall consider each of these, in order:

Verbatim memorizing. Not a little waste in study often results from the failure of teachers to appreciate the relation between clear understanding and the ease with which material may be learned. Young people are often required by teachers to "learn" things in the study of history and geography, or to memorize passages in literature, of which they have little or no understanding or appreciation. There are two things wrong with such a procedure. In the first place, in so far as the pupil lacks in understanding of the material, it will require more time to learn it and less time to forget it. It has by now been well demonstrated, by many conclusive experiments, that for most people the more meaningful material is, the more rapidly it may be learned and the more readily it may be recalled. In the second place, the usefulness of meaningless material is quite limited. To illustrate, much waste of time and effort has resulted from the common practice of requiring pupils to learn definitions, the full meaning of which they did not fully understand. Why does a pupil, for example, find it so difficult to learn to say that "a sentence is a group of words expressing a complete thought," when it is easy for him to

define a sentence — once he knows what it is? The learning of the definition in itself assists very little in arriving at an adequate understanding of what a sentence really is.

If exact definitions seem better to the teacher than a statement of the ideas in the student's own words, as might be the case when learning to use technical terms, the exact definition may be the more easily memorized, once the ideas lying behind the words are understood. It is certain that the sure way to economical, permanent, and useful learning is by learning the meaning first. The most effective teachers spend much time in developing meanings before requiring memorization.

Whole and part methods in memorizing. In memorizing prose or poetry verbatim, the first step should always consist in going through the whole selection a few times, studying the meaning very closely. One should first try to get a picture of the succession of the main ideas, and to break the selection up into certain large thought-units. Making an outline is usually very helpful. Unless the passage is quite long, say over 1500 or 2000 words, one should go through it as a whole several times before beginning the memorizing of any of it. Reading it over aloud is usually a helpful procedure. After these preliminary readings, one should attempt to look off occasionally, returning to the book when necessary. For economical learning, recall must be utilized early and often.

While the "whole method" is often recommended, and experiments have demonstrated that for passages not too long the whole method is more economical than the method of learning by lines or phrases, a combination method is better than either method alone. After having gone through the selection as a whole several times, or a major section of the whole, certain parts will have been well learned. Further repetition of these then will be unnecessary, and

one should now give special practice to the portions least clearly fixed. This should be done part by part, until each part in turn is learned. Then the material should be gone over again as a whole, recalling as much as possible.

It is generally conceded that, for most people, the line-by-line, or phrase-by-phrase method is clearly uneconomical. It violates the law of association, and has the advantage only of showing small immediate results — a few lines or a stanza or so — when no tangible results would be obtained so early if the whole or part-whole method were employed.

Learning the gist of things. Much more commonly needed, both in school and in life, is that type of learning which contemplates the retention of the main ideas only, and not the exact words of the text. Especially does this apply to the mastery of large units, or sections, or selections of subject-matter, where the object is to organize and master the main ideas presented. The following suggestions will be found useful by teachers in handling memory work of this type:

1. Go over the material carefully for the meaning, clearing up vague or difficult points as you go. The first impression is of most importance; it should be vivid and carefully made.
2. Note especially things which are important; that is, things which you will be likely to want to recall in the future. Note with pencil passages concerning which you wish to talk or to question others.
3. Read critically; agree or disagree with the author; compare with other authors; and connect up with previous parts or passages in the book.
4. Try to think of applications to everyday life — examples or illustrations — and try to verify from everyday life.
5. Try to visualize and to “concrete” the reading. Picture the scenes and the action in your mind’s eye.
6. At frequent intervals look away from the book, while carrying on the activities mentioned above.
7. At the close of logical units, look away from the reading and

- attempt to recall what you have read. A good form of recall is to write down the chief ideas, in sequence.
8. Refer to the material read for points you are unable to recall, and to check the accuracy of your recall.
 9. For those who have some difficulty in concentration or in organization, it is wise to make outlines. In these do not become irritated with the difficulties involved in logical co-ordination and subordination. It does not matter greatly if you make minor errors in getting all coördinate points properly represented. Sometimes a mere list of the main points, as pegs upon which to hang the details, will be sufficient.
 10. Remember that concentration is quite necessary in work of this sort. Frequent interruptions, distractions, mind-wandering, and intermittent or divided attention are all wasteful. In case you find it impossible to concentrate upon the work at hand, do some other type of work, and return to it later. Merely "going over" the material without attention is wasting time.
 11. Do not work too long at one sitting at work of this type. Usually from an hour to two hours is as long as can be spent profitably at one sitting in study by high school students. Much of course depends on the student, the interest he has in the subject-matter, the way he feels, the number and nature of the distractions, and other things, so that a general rule cannot be laid down. The student must learn to judge for himself. Usually less than twenty or thirty minutes spent in study is wasteful, and more than two or two and a half hours at a stretch is likely to prove uneconomical.
 12. Long periods should not be permitted to elapse between the early repetitions. Forgetting during the first forty-eight hours takes place quite rapidly.
 13. It is often wise to preserve the outline made at the first sitting, and at the next trial go through it again, and see how many points under each main head you can recall. Finally the outline itself ought to be learned, so that the student may recall the main points without reference to the book or outline. At first, repetitions and recall should be not more than a day apart; afterwards the intervals may gradually increase.
 14. Organize and relate the material to be learned. Above all, it should be remembered that organized material may be learned more readily than a series of unconnected ideas.

An excellent example of such organization, with which many students of education are familiar, may be found in Cubberley's *Public Education of the United States*, in which he groups the main events in the development of free, State, elementary, secondary, and higher schools under seven heads, each head constituting a "battle" or a phase of the development, as "The Battle for Tax Support," "The Battle to Eliminate the Pauper School Idea," etc. Charts and diagrams, with some general plan running throughout, also are helpful.

Usually the student should go over the material a time or two, after it is seemingly well learned. Things that are necessary to be retained for some time should be in this manner clearly "overlearned," and reviewed at increasing intervals. Students should learn early to fight down and master the impulse to cease repetition before the material is well learned. The inability to force one's self to do this type of drudgery develops slovenliness in learning, and in the long run is a costly luxury to encourage.

Learning unit associations. There are certain subjects in which much that must be learned cannot be so easily organized into logical schemes or groups. Shorthand symbols and foreign-language vocabularies offer excellent examples of such material. The considerations that apply in this type of learning are quite similar to those for the memorization of material verbatim, and those for memorizing the gist of things. The following should be kept in mind:

1. The importance of first impressions.
2. The necessity of concentrated attention in repetitions.
3. The necessity of recall and use.
4. The important part played in the facility of learning by establishing associations of similarity, or contrast, or of meaning, and by establishing relations by organization.
5. The necessity of uniformity or, to put it negatively, the importance of preventing incorrect repetition.

Let us consider each of these, and in the order given.

Importance of first impressions. In the beginning of the process of learning any word or symbol, one must get in mind at the very outset a clear and accurate copy or image of it. Great care should be taken, at the outset, to avoid wrong or inaccurate impressions. Often it will be desirable to write out the word or symbol to be learned a number of times, to bring out details that might escape one in a fleeting or a general visual or auditory image. One should be certain that the form practiced is exactly correct. Students of foreign languages should settle the question of correct spelling and pronunciation at the first acquaintance with the new word. Even though the word is not actually pronounced when it is written or seen, there takes place an inward pronunciation which may make future correct pronunciation less easy and less certain.

If there are special difficulties or weak points such as, for example, the inability to remember whether separate is spelled with an *a* or an *e* after *p*, some device to cause the letter to stand out is helpful. One may write the letter in colored ink or chalk and so visualize it, draw a circle around it in the word, or pronounce the word a number of times in such a way as to emphasize the *a*. Certain words or names may give special difficulty; to write these off on paper, with a colored pencil, and hang them up where they may be seen, may help much. The importance of the possession of a clear concept of what is to be learned on the part of the learner should not be undervalued. The same principle would hold true in learning shorthand symbols, names in chemistry, and technical terms and definitions.

Necessity of attention in repetitions. In going over a list of words in a vocabulary to be learned, a list of dates and corresponding events, States and capitals in geography, or similar material, it should be borne in mind that concentration of attention is as necessary as repetition. Ebbinghaus,

an eminent German psychologist, relates that after having repeated nonsense syllables to a number of subjects in an experiment until each had learned them, he found that he himself was unable to recall them.

At times it will be necessary to reënforce attention by special means. Saying over the material aloud may help. Writing it out tends to concentrate attention. It has been shown, too, that repetition by the use of more than one sense gives better results than where just one sense avenue is employed. It is better for the student to read the material, to say it, to listen to himself say it, to write it out, and to hang up the written words where they may be seen, than to do only one of these. We used to think that people belonged to one of three types of learners — visual, audile, or motile. We now believe that people ordinarily do not differ materially from one another in this respect, and that even one who is a visualizer should also use other means of presentation.

Necessity of early recall and use. In this type of learning, as in any other, one should not delay too long in attempting recall, but should begin to become independent of book or notes as soon as possible. Written recall is very useful in the early stages. James tells us that in establishing a habit we should seize every opportunity for its exercise, and permit no exceptions. Likewise in memorizing such more or less individual facts as foreign language vocabularies, dates, shorthand characters, or the items of tables, one should avail one's self of every opportunity to make use of the item being learned.

Importance of association in learning. One cannot escape the fact that retention and recall are the creatures of association. One might well say that one can remember only by establishing associations of some sort, natural or arbitrary. All commercial systems for improving the

memory are based on this fact. One ties a string around the finger, and thinks of a purchase to be made while down town. Both are allowed to sink out of immediate consciousness. One might not ordinarily receive any stimulus which, by reason of some association, would touch off the thought of the purchase, but the string on one's finger, because of its being in ready view, is quite likely to come into consciousness a number of times and, by reason of the association established, remind one of the purchase.

Let us refer again to the illustration of spelling the word separate. I have no difficulty in spelling this word correctly, though my memory may fail me at first. This is due to the fact that I once established the association between separate and the Latin word "parare," from which it is derived. Kitson gives, as an example of logical association, the German word "rathausmarket." One recalls "rat — advice; haus — house; market — market-square." By the use of these associations one comes to the meaning "council-house square," or "city-hall square." It is noticeable that a word so reasoned out tends to be more easily recalled in the future than words associated merely by repetition, granting the same amount of time spent in the study of each. I have never forgotten the battle of Hastings in 1066 because of its association, which appealed to me as a high school boy, with the shooting of arrows in the air and the blinding of King Harold.

Wherever possible, unit associations should be built into connected wholes. Various schemes have been employed by history teachers for this purpose.

Use of various memory devices. In instances where there appears to be no natural scheme of organization, mnemonic devices may be employed. Aside from their value in assisting recall directly, they often serve to stimulate the interest of young people, who have a natural weakness for

schemes for "saving" labor. Two devices sometimes used by teachers of European history which are illustrative are given below:

1. To assist in remembering the order of the ruling families in England.

No	Norman
plan	Plantagenet
like	Lancaster
yours	York
to	Tudor
study	Stuart
our	Orange
history or	Hanover or
biography.	Brunswick.

2. To assist in the retention and recall of the countries that composed the Holy Alliance.

H Holy	Holy	Holy
A Alliance	Alliance .	Alliance
R Russia	Religion	Reactionary
A Austria	and	Absolutism
P Prussia	Peace Pretender	Promoted.

Physics students may recall the colors of the spectrum through the use of the word V-I-B-G-Y-O-R (violet, indigo, blue, green, yellow, orange, red).

Whether or not such devices as these can be thought of, some organization should be made so that the materials will be associated and the mind will tend to form associative bonds, so that ready recall may be fostered.

If things to be learned can be organized into rhyme or rhythm, or both, learning is facilitated. Witness "*I before e, except after c*"; "Thirty days has September, April, June, and November"; etc.

Good foreign-language teachers have been able to work out dozens of schemes and arrangements of facts to be learned, such as schemes for forming the verb forms of the

various tenses, cases, numbers, moods, etc. Mathematics teachers have used such schemes as the following for remembering values of trigonometric functions:

	0	30	45	60	90
sin	$\frac{1}{2}\sqrt{0}$	$\frac{1}{2}\sqrt{1}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}\sqrt{3}$	$\frac{1}{2}\sqrt{4}$
cos	$\frac{1}{2}\sqrt{4}$	$\frac{1}{2}\sqrt{3}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}\sqrt{1}$	$\frac{1}{2}\sqrt{0}$

Music teachers have similar helps for remembering the location of notes on the scale, and the interpretation of signatures.

In all memory work, including such schemes as these, one should be satisfied that economy results from the use of the device, and that the additional work involved in the scheme does not more than offset the time saved from repetition. It is important also to consider whether the device insures permanency. Sometimes it happens that one can learn associations by mere repetition more quickly than with the use of a device of the type mentioned above. While these devices for organizing material to be learned are often quite helpful, natural associations should always be looked for and utilized in preference to artificial associations.

Importance of avoiding incorrect repetitions. Worse than no practice or repetition is wrong or inaccurate repetition. Care should be taken at the outset to watch for errors in reproduction. As was pointed out earlier in the discussion of the laws of learning, exceptions are more significant than mere disuse. The associative paths established by rival, inaccurate repetitions operate to limit the normal gain which would come from correct practice.

While exceptions or inaccurate practice at the outset are especially significant, the influence of such at any time is costly. The subsequent building up of the proper associative paths between stimulus and response, as for example

between name and date, or one word or phrase and the next, will not only be accomplished at greater cost of time and effort, but there will always remain traces of the undesired path established by the inaccurate practice. At any unguarded moment the inaccurate response may operate to substitute itself for the proper association. Some plan of checking, such as recalling with the book open, or reciting aloud to another person, is to be recommended. This checking should not be delayed until after the inaccurate response has been repeated many times. It is also desirable to check later, as inaccuracies creep in quite often in an unexplainable manner.

2. Teaching how to use books

Reading as a study activity. A large share of study activity is spent in reading and the thinking which goes along with it. As was pointed out in a general way in Chapter I, teachers should require much more extensive reading than is commonly done, and less repetition of highly concentrated textbook material. Collateral and supplementary reading material should be used in abundance in all content subjects, such as natural science, history, civics, economics, and geography. Almost as unfortunate as the one-book teacher is the textbook student. The use of abundant collateral and supplementary material furnishes not only a better chance for real mastery, and real sensing of spirit and atmosphere, but contributes to habits and skills of reading widely, rapidly, and intelligently which in themselves are of immense importance in the matter of becoming educated. Some people read much more effectively than do others; they have developed much more skill in reading, and they read much more thoroughly or much more rapidly, or both.

Teaching pupils to read. One of the reasons why students

fail to profit more by reason of the reading they do is that they are not prepared for the particular reading they set out to do. They do not approach the material to be read with any purpose or objective in mind. They read merely for general familiarity. Unless the material is intrinsically interesting, or unless the student has acquired habits of reacting vigorously to everything read, the results often are not satisfactory. The student may eventually learn to get himself into an appropriate "set" for the material to be read, but for most high school pupils this can be better done by the instructor when the material is assigned. Problems should be set, an introduction to the material made, important points mentioned, suggestions as to relative emphasis offered, and if possible interest aroused. Study questions, problems, or projects are very effective means to use here.

The student should be taught to make at the outset a rapid survey of the material to be read, and to get a bird's-eye view of the material and its plan of organization. In most instances, in taking up a new book, it is wise to note the author, his position, the date of publication, and to read the preface and the introduction. These preliminaries yield a background against which the ideas present may be projected for interpretation.

Learning to read with thoroughness. It should be recognized that there are two types of reading. The first is a careful and critical reading, calculated to give a rather strong grasp of the material and to provide an opportunity for supplementing the thought of the author. The second is rapid reading, or "skimming," where a general familiarity is all that is desired, or where a search for material to be read more carefully is being carried on. The techniques for the two kinds of reading are somewhat different.

In reading for mastery, one must first of all arrange a

favorable environment, and assume an attitude of concentration. One should get before one the purposes of the reading, and decide what one hopes to get out of the reading. One should react definitely to all that is read. Each sentence must be examined for its central thought, and related to the line of development of the paragraph in which it is contained. Likewise the thought of each paragraph must be gotten clearly in mind before going on to the next. Continuous recall must be practiced. Sentences, or even paragraphs, must be re-read where recall shows a lack of mastery. These things the student must learn to do, and the best means by which he learns these things is that he be taught.

The student also should be taught to acquire a habit of reacting to and supplementing the thought of the author. He should learn to question, doubt, approve, disagree, modify, apply, and compare the material read. He should be encouraged to put questions to the author, possibly raising these in class. The student must be brought to realize that not everything that appears in a book is to be accepted uncritically, or even to be accepted at all, but is to be reacted to on its merits.

Pupils, too, should be taught to picture the things they are reading. After students advance above the lowest levels in learning to read they are confronted with the danger of allowing reading to consist largely in calling words rapidly, with little or faint accompanying imagery. This sort of reading does not result in complete understanding, nor is it as likely to result in retention as where the reading process is accompanied by the stimulation of vivid illustrative imagery. Thinking of concrete examples, or application of the reading, are excellent devices in this connection.

Taking notes on reading. In order to insure and intensify the reaction to the reading material, the setting of some sort

of material task often is advisable, such as the taking of notes or outlining. Definite training in note-taking should be given in the class period. The teaching of students to take serviceable notes on what they read is no easy task. They must be taught to select, to relate, and to summarize. It is difficult but necessary to wean them away from copying whole sentences verbatim. Advise them to read through a whole paragraph, and to close the book and write down the chief thought as a device for training in note-taking.

Many of the better books are organized so that outlining is a simple matter — in fact each chapter is preceded by an outline, or closed with a summary. Care must be taken that such devices are not relied upon to too great an extent in note-taking. When such books are used, it may be better to write out briefly the gist of each paragraph or section in one's own words. It is an excellent practice to then re-read the material, comparing it with the notes or outline made.

Learning to read rapidly. As previously suggested, there are two types of reading — reading slowly for complete comprehension and reflection, and “skimming” for general familiarity or as searching. The degree to which one may be said to be an effective reader is in proportion to the degree to which one can perform both types of reading, and to which one can discriminate as to when it is advisable to use either type. The best reader is that one who not only can skim through a page at a glance or two, and grasp the main ideas presented, but who can instead upon occasion grasp the significance in detail of all on the page, and accompany the process with valuable reflection and reaction.

By the time students reach the junior high school they should begin to develop the power to read rapidly. They should be taught to glance through a chapter of twenty-five or thirty pages in a few minutes in search of material relevant to their needs, or to skim it in a half-hour. They must be

taught to look for topic sentences, to read just enough of many sentences to anticipate the rest, and to grasp at a glance parts of several lines — enough to furnish basis for judging whether they shall read the chapter in detail or not.

Class time may well be taken for practice in rapid reading. The use of time limits may help. Encourage students to urge themselves forward, grasping at phrases and ideas and not words, and to forget pronunciation completely. The student who has reached the junior high school and has not as yet been weaned away from the habit of pronouncing words to himself, either physically or even just mentally, should be urged to break the practice as soon as possible.

As a device for stimulating interest and practice in rapid silent reading, and in grasping the meaning of a paragraph by ideas rather than by words, students may be persuaded to time themselves, and to be constantly attempting to beat their own records, yet always reading sufficiently closely to grasp the gist of what is being read.

Building habits of reference. Quite often the student asks for a meaning, a spelling, or a pronunciation. Not always but usually this help should be refused, if suitable reference books are available and the student has not made a reasonable effort in helping himself. One of the most effective services a teacher may render a high school pupil is to train him in the effective use of reference works.

There are two phases of such training, and neither is of much value unless accompanied by the other. One consists in teaching him how to use the different kinds of reference works, and the other in inculcating habits of using them. In the supervised-study period the student should be given every encouragement to refer to dictionary, index, and previous references in the text. Rarely should students be told what they can find out for themselves, but rather there

should develop a tradition which would permit only the most dependent of students to ask for help on points on which they can find what is needed by a little personal effort.

The use of reference works. Teachers should ascertain, early in the course and in a quiet informal way, and indirectly if possible, what instruction the students need along this line. It is interesting to note that many college students do not know the meaning of common abbreviations found in the dictionary, such as *L.*, *Geol.*, *pl.*, *Syn.*, *a.*, *adv.*, and *v.t.* To that extent that very important tool has never been completely utilized by them. They have never been able to tell which of two or more words, spelled exactly alike, was the one for the meaning of which they sought. A knowledge of the meaning of such abbreviations as *n.*, *v.*, *f.*, and *adj.*, would have made the matter for them a simple task.

Attention should be called to the various types of information that may be found in the dictionary, and to the value of indices and pronouncing gazetteers. As early as the seventh grade the child should be weaned away from small-sized dictionaries. As Thorndike has pointed out, these little dictionaries are not adapted for little people. Not enough explanation is given, and usually there are no examples of the meaning of the word. The word is often defined in words equally unknown, which when looked up lead to a circuit which comes back soon to the original words. The synonyms given are often only approximations, and the difference in shades of meaning is not made clear.

Students should also be trained in the use of the library. They should have the classification system explained to them, and how to use the card catalogue. Many teachers take their classes to the library in a body, and introduce them to the books pertaining to the material to be studied by the particular class. Where classes are too large for this type of excursion, an assignment which involves a look

through the books may be made. Unfortunately not only are students at times not made aware of what aids to their study are in the library, but one occasionally encounters teachers who have never checked up to see what books relating to their fields may be found in the library.

In the case of school libraries where journals and magazines are taken, and the back numbers preserved, senior high school students should be taught to use the *Reader's Guide to Literature*. Both junior and senior high school students should early be taught the value of the standard encyclopædias.

All this information is of no consequence, though, unless the students avail themselves of it. It is quite as necessary that they develop habits of using the reference aids as that they acquire information about them. Many teachers concentrate on developing the "dictionary habit." No teacher who has understandingly read John Dewey's discussion of the relation of language to thought, in his *How We Think*, or who understands the important part played by vocabulary in intelligence, would minimize the importance of habituating pupils in the use of the dictionary. To a lesser degree, the same things may be said of other reference books. So it is that much work must be assigned which will give practice in the use of reference books, and so it is that the supervised-study teacher must insist on shifting the dependence of students to working tools, and away from the instructor.

3. *Teaching pupils to study for appreciation and enjoyment*

Technique of teaching study for appreciation. The beginning of training in study for appreciation is made in the class period. Pupils must first of all have their attention called to representative samples of the type or level of the quality the appreciation of which is to be developed.

Ordinarily young people are slow to seek the things which are of the highest order with respect to æsthetic qualities. The typical pupil, if left to his own devices, will seek objects and situations which give the grossest satisfaction to what appreciation he has previously developed, while progress demands attention to objects and situations of progressively slightly higher levels. The student needs to be introduced properly to sources of enjoyment of this higher sort by being given, under favorable conditions, a taste of beauty of form or theme. This can usually be best done by an interpretation by the instructor. Reading selections from a book will often result in such satisfaction to the pupil, and will arouse sufficient interest, that he will desire to read the rest of it, or other selections of a similar nature. Pointing out the true significance of a man, a movement, or an institution to civilization serves to increase the probability that the pupil will appreciate these things independently at future opportunities. The occasional use of good magazines in class for high-grade entertainment greatly increases the probability that the pupils will seek these publications voluntarily later on.

A second function of the teacher is that of arousing interest on the part of the pupil in representations of beauty of form or theme. This may be done in numerous ways. Visual material is excellent for this purpose. The concreteness tends to bridge the chasm of verbalism which has previously held off the student. It gives the apperceptive basis and the imagery necessary for real appreciation. One does not appreciate just words. Special human-interest stories about the author, the plot, the character, or the writing of a piece of literature often are useful. The teacher should practice the members of the class in picturing vividly the thoughts, situations, and characters of literature. Much time may well be spent in this type of exercise, developing habits as

well as the power on the part of the pupil of really experiencing what is being read. The student needs much training in picturing and dwelling upon the thought, as well as the form, of both art and music. This type of training should replace much of the study of technical form in subjects where the aim is the development of interest and appreciation.

Above all, it is necessary to lead the novice to discover the criteria or the elements which go to make up the value of the thing to be appreciated. The student must be trained to know what to look for, so that he will be certain to notice the qualities which are the sources of merit. Upon the higher levels, appreciation is something more than feeling good in the presence of the appreciation stimulus. Such appreciation, while possibly more natural, is certainly of a grosser and a coarser order. The student may be trained to see readily the points of form which go to make up art. He may be trained to look for art, and to dwell upon the theme or the message. Perhaps nothing contributes more to such training than continual practice in noting these things, under conditions which generate favorable attitudes on the part of the learner. While it is necessary that the pupil come to know what are the real sources of beauty, so that they may not escape him, these cannot be taught him as so much to learn, nor will methods serve which are characterized by any undue direct influence of the teacher. The suggestions for developing appreciation in the recitation period, given in Chapter VII, should be carefully observed in this phase of the work.

Supervising study for appreciation in the study period. The teacher in the study period may follow up the work begun in the recitation period, when a supervised-study plan is used. It is much easier to influence some pupils as individuals than as members of a class. Suggestions given

personally and privately are often of much more influence than when given before the class. There is opportunity in the supervised-study period for suggesting to pupils, somewhat incidentally and in a manner indicating personal interest, things to read or to do which will contribute to the pupil's development of appreciation. It should always be remembered that appreciation is the outcome of continued contacts with representatives of the levels to be appreciated. While it is true that these contacts must take place so as not to arouse antagonisms on the part of the learner, yet the prime essential is the continued experience with the right things. Interest is in this sense a consequence of attention. The developing of appreciation is not entirely unlike learning to like olives or cigarettes. Continued contacts, under favorable conditions, tend to replace indifference or even antagonism with interest. Things which eventually give us great pleasure of a high order, are usually of little interest to us at the beginning or in our youth. The teacher who can induce pupils now and then to attempt appropriate material may be of valuable service in providing these preliminary contacts.

In teaching pupils how to study for appreciation, care should be taken to begin on the pupils' level, and to avoid raising the level of the material more rapidly than the student will follow. To fail to observe these precautions may serve to arouse antagonism or distaste, as thousands of students of literature in high schools will testify.

Providing opportunity for expression. Very often, though not always, it is wise to provide opportunity for the pupil to express his appreciation as it is developed. This is a most delicate task. Nothing resembling compulsion or "assignment" must be allowed to creep in. The desired situation is that of the pupil wishing to entertain or inform others, to share his appreciation, or to give vent to his enthusiasm. In

case something of this situation is not brought about, it is definitely better not to push the matter. Much care must be used to prevent the pupil from being influenced by a desire to "stand well" with the instructor. That sort of thing not only serves to defeat the development of true appreciation, as far as the particular pupil is concerned; it also prejudices the class unnecessarily. An informal class discussion, in which every one feels quite free to express his true feelings, where the sincerity and fairness of the teacher is obvious, and where no attempt is made to influence the pupil directly in his comment, constitutes an effective opportunity to strengthen appreciations by expression.

4. Other types of training for study

The study program. A large number of high school principals, believing that better results are obtainable thereby, have asked all students to make out a study program, scheduling the study of certain subjects for certain hours. Perhaps the necessity for doing this decreases with the incorporation of study time in the recitation period, but it is a useful proceeding under any conditions. In some high schools this study program includes home study as well. A parent is asked to approve and sign the program. This is to call the attention of the parent to the desirability of some home study, and to enlist the aid of the home in encouraging it. The program is then inspected by the student's faculty adviser with a view to suggesting better arrangements, though the final choice lies entirely with the pupil. Reavis, who made a thorough study of the use of a study program by high school pupils, concluded that there was a very substantial gain in student preparation which could be ascribed to their use. Students commending the plan claimed that the use of the study program:

1. Prevented monopoly of the study time by favorite subjects, and insured some time for each subject.
2. Reduced the amount of time wasted in getting down to study, deciding what to study, and getting started.
3. Resulted in more and better work and better grades.
4. Operated to discourage quitting a subject when the student begins to tire of it.

With most pupils the study program will also reduce the amount of irritation in starting unpleasant tasks. When such have been reduced to routine, much of the unpleasantness in getting started is avoided by making the starting mechanical.

Information about methods of study. Many teachers or principals have seen the need for teaching students the more simple and useful facts relating to methods of study and learning. This has been done by means of lectures on how to study; by giving courses on how to study; by recommending that students read such books on study as those listed at the close of this chapter; and by preparing "Directions for Study," "Suggestions on How to Study," "Study Helps and Hints," and the like, and distributing them to the students. The last mentioned of the devices is the one most widely used. Where such a list of directions is employed, they should be gone over orally in class by the classroom teacher. He should explain and illustrate the application of the suggestions to his subject, and add a number of suggestions pertaining particularly to his special field.

The following list of suggestions is illustrative of what might be employed for this service. They are based very largely on the rules for effective study, as laid down by Dr. G. W. Whipple in his *How to Study Effectively*.

1. Keep yourself in good physical condition. Provide for proper sleep — nine hours for the average student in senior high

school, and ten hours for the average student in junior high school — frequent exercise, and keep your bowels open.

2. Attend to the removal or treatment of physical defects that handicap mental activity, such as defective eyesight, defective hearing, defective teeth, adenoids, and obstructed nasal breathing. Have your teeth examined yearly.
3. See that external conditions of work — light, temperature, humidity, clothing, chair, desk, etc. — are favorable to study. Never allow the light to shine in your eyes. Do not allow the room to become stuffy.
4. Form a place-study habit.
5. Formulate a time-study plan. Don't dawdle in getting started.
6. When possible, prepare the advance assignments in a given subject directly after the day's recitation in it.
7. Begin work promptly.
8. Take on the attitude of attention.
9. Work intensely while you work. Concentrate.
10. Don't let intense application become changed into fluster or worry.
11. Do your work with the intent to learn and to remember.
12. Get rid of the idea that you are working for the teacher.
13. Don't apply for help until you have to.
14. Have a clear notion of the aim. Decide what the purposes of the study are, and what you ought to get out of it.
15. Make a rapid preliminary survey of the assigned material.
16. Give the most time and attention to the weak points in your knowledge or technique.
17. Carry the learning of all important items beyond the point necessary for immediate recall.
18. Constantly pass judgment as to the degree of importance of items that are brought before you, and lay stress on the permanent fixing of those items that are vital and fundamental.
19. When a given bit of information is clearly of subordinate importance, and useful only for the time being, you are warranted in giving to it only sufficient attention to hold it over the time in question.
20. Make the duration of your periods of study long enough to utilize "warming-up," but not so long as to produce weariness or fatigue.

21. When drill or repetition is necessary, distribute over one or more than one period the time given to a specified learning.
22. When you interrupt your work not only stop at a natural break, but also leave a cue for its quick resumption.
23. After intensive application, especially to new material, pause for a time and let your mind lie fallow before taking up anything else.
24. Use various devices to compel yourself to think over your work.
25. Form the habit of working out your own concrete examples of all general rules and principles.
26. Form the habit of mentally reviewing every paragraph as soon as you have read it.
27. Don't hesitate to mark up your own books to make essential ideas stand out visibly.
28. Whenever your desire is to master material that is at all extensive and complete, make an outline of it; if you also wish to retain this material, commit your outline to memory.
29. In all your work, apply your knowledge as much as possible and as soon as possible.
30. Cultivate the habit of criticizing, agreeing with, disagreeing with, or doubting whatever is read.
31. Do not hesitate to commit to memory verbatim such materials as definitions of technical terms, formulas, dates, and outlines, always provided of course that you understand them.
32. When the material to be "learned by heart" presents no obvious rational associations, it is perfectly legitimate to invent some artificial scheme for learning and recalling it.
33. In committing to memory a poem, declamation, or oration, do not begin by breaking it up into parts, but go over it as a whole a number of times, thus getting a complete picture of the whole before concentrating on specific parts.
34. In committing to memory, it is better to read aloud than to read silently, and better to read rapidly than slowly.
35. If your work includes attendance at lectures, take a moderate amount of notes during the lectures, use a system of abbreviations, and rewrite these notes daily, amplifying them into a reasonably compendious outline.
36. Check every temptation to consider doing more pleasant tasks until you are through. Do not interrupt your study for things that can be done later.

37. Break yourself of the habit of day-dreaming, if you suffer from it.
38. Cultivate the reference habit. Consult the dictionary for the meaning and pronunciation of strange words. Look up new countries and places in the encyclopædia.
39. Cultivate the habit of going over the main points or your weak points at the conclusion of your study. Summarize the main points, and be sure you have learned them.
40. Review briefly at your last opportunity before going to class.

Simply giving these suggestions to students will not suffice. There should be a constant follow-up. Pupils should be trained in the suggested procedures, and should have particular ones called to their attention, in an agreeable manner, from time to time. Acquainting the student with the suggestions should be regarded as but a favorable beginning.

Supervising the study of the special subjects. While in the main the most effective study procedures are common to the study of most all subjects taught in high school, the study of each subject will vary to some extent from the study of other subjects. For example, there are many little points or suggestions on the technique of study in a foreign language which are peculiar to the study of that subject. The classroom teacher, therefore, finds it useful to train the students in the methods of study especially adapted to the subject being taught. The teacher should accordingly be constantly thinking of points of technique which the student of his subject should acquire.

It is suggested that the teacher make a list of all the suggestions or points of technique with which he can reasonably hope to familiarize his students. In these particulars the pupils may be given training in the supervised-study period. The teacher may throw out these suggestions to students individually, and at appropriate times, or such a list may be put before the student in the

form of a printed, mimeographed, or hektographed list, or be placed on the blackboard to be copied by the students. Many progressive teachers adapt the list of suggestions on "How to Study" to their special subjects, and give this to the students as an aid to improving study technique.

Below is given such a list of study suggestions for use in history classes; these may be considered as illustrative for other subjects.

Suggestions for the study of history

1. Find a comfortable place to study, with good light and free from distractions.
2. Get in advance all the books and material you will need before starting to study.
3. Look over your notes taken on the assignment, and get in mind definitely what it is that you are to do.
4. Look for the important facts, and make special note of them in the form of an outline or list.
5. Memorize the most important dates, names, and facts.
6. Form the habit of consulting reference aids regularly, and look up the pronunciation of all new names and other words; look up the definition of all new words; look up the location of every new city, country, or other geographical unit not already known to you. Do not get into the habit of slipping over these matters.
7. Take careful note of each picture in the book, and see if you can tell why the author thought it worth while to put it in.
8. Always look for reasons and for motives as you read.
9. Try to determine the principal causes of every war, or great movement or occurrence, such as the decline of the Roman Empire, the Reformation, the French Revolution, etc.
10. Stop frequently to see if you can recall a summary of what you have just read.
11. Make a note of questions to ask in class.
12. Read over the same topics in another history, and compare the two discussions.
13. Check up to see if you have accomplished what the assignment called for.

The following list of suggestions is for illustration of what may be provided students of mathematics:

Suggestions for the study of mathematics

1. Find a comfortable place to study, with good light and free from distractions.
2. Get in advance all the books and material you will need before starting to study.
3. Look over your notes taken on the assignment, and get in mind definitely what it is that you are to do.
4. Read all directions, problems, theorems, or original exercises carefully, and get clearly in mind:
 - a. What is to be found, and
 - b. What is given that will be useful.
5. Employ correct and neat form in writing down the solution of the problems; label the partial answers as they are obtained. Many trivial mistakes may be thus prevented.
6. Under no circumstances allow a friend to assist you, unless he explains the solution as he goes.
7. When in difficulty re-read the problem, examine the example worked out in the book if there is one, glance back through your work as far as you have gone and likewise over the work covered the last few days in the textbook, and perhaps helpful ideas will occur to you.
8. Check your work wherever there is the least possibility of error. In using mathematics in business, you must know absolutely that your solution is correct.
9. Test your answers by trying to determine if they are reasonable.
10. Make note of difficult points or questions to ask at the next class meeting.

Such lists as these should not only be given to students early in the course, but, as needed, each suggestion should be repeated to the class or to individuals until they have been incorporated into the study practices of the members of the class.

Here again the teacher should bear in mind that the value of such a list is directly dependent upon the extent to

which the habit of and skill in using the suggestions are developed in the pupil. Effort should be made, throughout the course, to cause the pupils to acquire proficiency in the use of the suggestions. Care, of course, must be exercised that the student does not come to feel that he is being "nagged."

Helping pupils to acquire skills and motor control. In all subjects there are certain units or phases of the study which partake of the nature of acquiring skill, or motor control. In high school mathematics such skills include speed and accuracy in the four fundamental operations with literal and signed numbers, in the manipulation of equations, in drawing figures, in writing out proofs, and other somewhat similar skills. Much of the work in English centers upon skills, particularly the skills of writing and speaking correct, fluent, and effective English. In foreign languages much time is spent in learning correct pronunciation and sentence organization. Skill as well as memory is involved in translating. In history and the social sciences the work is largely a matter of acquiring information, appreciations, ideals, and interests, but even here skills constitute an important part of the work, such as acquiring skill in the use of books and in problem-solving. The same may be said of the study of natural science in the laboratory, much of which is of the nature of skill development. Drawing, music, typewriting, and shorthand are subjects which consist chiefly in the development of skills. Much of what was said in the previous discussion of habits and skills as outcomes of teaching is pertinent and important to the teacher supervising the study activities of pupils.

Suggestions as to drills for skill or habit formation. Where practice for skill or habit formation is being supervised, the suggestions given in Chapter I should be observed. Above all the following essentials should be kept in mind:

1. The necessity of a desire on the part of the student to acquire or perfect the skill or habit.
2. The necessity of a clear understanding on the part of the student of what he is attempting to acquire — a clear idea as to the movements involved.
3. The necessity of continued attention and interest in practice.
4. The necessity of a diagnosis of weaknesses, and for specially adapted types of practice.
5. The desirability of practice in situations as nearly like the situation in which it will be used as is possible.

In addition to the rules and suggestions listed in Chapter I, there are certain others which should be of service to instructors in assisting pupils to acquire skills. These may be enumerated, as follows:

1. The elements of a skill or associated skills should be arranged in the proper sequence.
 - a. Care should be taken to introduce prerequisite skills early.
 - b. Ordinarily it is wise to introduce the less difficult and the more interesting first.
 - c. New elements should not be introduced until the old have been sufficiently mastered, that the addition of new difficulties will not confuse the learner.
2. Watch must be maintained to discover situations where it seems wise to segregate some specific element of a skill for special and separate drill, such as a certain movement in a swimming stroke, or a certain sound in a foreign language. Although this procedure would seem to violate the maxim "to practice in a situation as much like that to which the skill is to be used as is possible," there are times when to practice in such a situation is not economical. This may be the time for either or both of two following courses:
 - a. The situation in which the skill will be used may be too complex to be learned as a whole. It may then be better to practice separately portions or phases of the entire series of associated skills.
 - b. It may be that skill has been developed in some phases of the desired complex reactions much out of proportion

to others, and that economy dictates special practice on the weak elements.

3. Learners should be encouraged to practice and apply skills being learned at every opportunity, such as to practice speaking the foreign language out of class; to employ skills in English in all written or oral language; or to always employ the "form" being learned even though better results may be attained at present by the old or incorrect form, as in sports and games.
4. Provision should be made for individual differences among pupils in learning ability.
 - a. Rapid pupils should not be held back, overdrilled, and their interest killed by continued practice, after they have reached the desired limits of proficiency.
 - b. Slower pupils should not be encouraged to hasten on to new difficulties or elements, until the old are sufficiently mastered to warrant progress.
 - c. Different pupils will develop different typical errors, and these should be dealt with individually.
5. Use should be made of specially prepared drill material, where such is available, such as practice sheets and tests for algebra, and practice tablets or sheets for punctuation and grammar. These are time-saving devices, and usually are more carefully devised than practice material organized on the spur of the need by the teacher.
6. Standard tests may be used to advantage in developing skills in certain subjects, especially when the test used gives emphasis to skills.
 - a. The tests may be used to determine if the degree of proficiency attained is such that the drill on the particular point may cease, or:
 - b. They may be used as a means of motivating practice by furnishing a definite standard toward which the student may work, and thus providing a means for making his progress clear.

Teaching pupils to solve problems. Pupils need to be trained to attack independently, during the study period, problems requiring a formal problem-solving technique. Training in this type of thinking procedure should be given

as a group exercise, until pupils are able to carry it on independently, after which opportunity for its employment and the development of skill in problem-solving should be provided. This type of teaching is of such fundamental importance for the proper mental development of the pupil, and an understanding of its technique is of such large importance to the teacher, that a separate chapter has been given to problem-solving teaching, further on in the book.

Having now considered the main problems of classroom management, planning the teaching, the supervision of pupil study, and training pupils how to study, we are now ready to pass to a consideration of the technique of the newer methods in high school teaching. We shall begin with visual instruction and the technique of using visual aids, to which we shall devote the two chapters which follow.

QUESTIONS AND EXERCISES

1. Do you believe that a course in "How to Study" should be given in the high school? If not, why not? If so, how would you teach such a course?
2. How does the line-by-line method of memorizing violate the law of association?
3. To what extent is there a real need for verbatim memorizing in your teaching subject? Learning unit associations? Learning the gist of things?
4. Review that part of Chapter V which deals with the retention of information and the acquisition of habits and skills.
5. What suggestions for developing skills and habits can you add to those mentioned in Chapter V and this chapter?
6. Time your reading rate on five pages of this chapter, going at a rate to understand rather clearly what is being read. Compare this with that of others over the same material.
7. What is your opinion of the value of having students make out study programs? Do you have any suggestions for employing this plan?
8. Go over the 40 rules for study, and think through each one. With which ones would you disagree? Which ones do you think would vary with individuals? Be able to explain each and to give examples.
9. Make a supplementary list of suggestions on how to study your teaching subject.

10. Mention a number of things that would be worth doing in teaching pupils how to study your teaching subject.

SELECTED REFERENCES

Cunningham, Harry A. "Teaching How to Study"; in *School Review*, vol. 33, p. 355. (May, 1925.)

A description of an attempt at teaching directly pupils of a high school how to study

Dearborn, George V. *How to Learn Easily*. New York: Little, Brown & Co., 1916. Pp. 227.

A very reasonable treatment of the psychology and technique of learning, written for the layman.

Holley, C. E. *The Teacher's Technique*. New York: The Century Co., 1922.

Chapter VIII. "Forming Habits and Rote Associations." Brief.

Chapter XIII. "Teaching Pupils to Study Effectively."

Kitson, Harry D. *How to Use Your Mind*. J. B. Lippincott Co., 1916. Pp. 153.

Good comprehensive discussion. Practical and popular style.

Kornhauser, Arthur W. *How to Study*. Chicago: University of Chicago Press, 1924. Pp. 42.

A very concise summary of the principal authoritative suggestions on how to study. Recommended.

McClusky, F. D., and Dolch, Edward William. "A Study Outline Test"; in *The School Review*, vol. 32, pp. 757-72. (December, 1924.)

Describes a test for determining whether pupils know how to make study outlines.

McMurry, F. M. *How to Study*. Boston: Houghton Mifflin Co., 1909. Pp. 281.

A careful theoretical analysis and discussion of eight factors in studying.

Monroe, Walter S., and Mohlman, Dora Keen. *Training in the Technique of Study*. Pp. 66. University of Illinois Bulletin, vol. XXII, no. 2. (September, 1924.)

The results of diagnosis of difficulty of industrial students and of specially prescribed training in certain methods of study.

Pyle, William Henry. *Psychological Principles Applied to Teaching*. Baltimore: Warwick & York, Inc., 1924. Pp. 188.

A list of over a hundred suggestions on learning with very short discussion of each.

Richards, G. E. "High School Students' Description of their Methods of Study"; in *School Review*, vol. 21, pp. 673-77. (May, 1913.)

An eye-opener as to the variation in student method and the need for training.

Starch, Daniel. *Educational Psychology*. New York: The Macmillan Co., 1919.

Chapter XII, "How to Study." Practical suggestions from the standpoint of psychology.

Strayer, George D., and Norsworthy, Naomi. *How to Teach*. The Macmillan Co., 1917.

Chapter V, "How to Memorize"; Chapter XIV, "How to Study."

Whipple, Guy M. *How to Study Effectively*. Public School Publishing Co., 1915. Pp. 44.

A practical manual of suggestions based on psychology with a brief discussion of each.

CHAPTER VI

VISUAL INSTRUCTION

1. *The need for adequate imagery:* Imagery in learning — The problem of verbalism — Causes of verbalism in the schools — Increased need for visual aids — Visual instruction out of school.
2. *Values of visual instruction:* As a means of stimulating adequate imagery — Advantages of visual instruction — Accuracy of image — Vividness of image — Economy of time — Permanence of retention — Value of visual material as a supplementary device or aid — Selection of materials for visual presentation.
3. *Limitations and dangers of visual instruction:* Indiscriminate use of visual materials — Faulty technique in using visual aids — Small amount of thinking required — Weakens language training — Objections to the use of films — Educational films now available — Films to parallel instruction — Expense for films — Educational films and the "movies" — Films *vs.* slides.
4. *Equipment needed for visual instruction:* Projection equipment — Other equipment.
Questions and exercises — Selected references.

1. *The need for adequate imagery*

Imagery in learning. The most worth-while learning takes place when fairly accurate and vivid imagery accompanies the learning of the verbal symbols. Then we commonly say that we "understand." The important thing in most instances is not the printed symbol, but the imagery for which the printed symbol stands. It avails nothing to have children learn rules, laws, descriptions, or narratives, except as they acquire concomitantly adequate imagery as to what the rules, laws, descriptions, or narratives mean. Learning that "the value of digits in numbers increases from right to left in decimal ratio" may be a sheer waste of time and energy. Only to the extent that the learner forms in mind a clear idea or picture of the thing described — the meaning of "digits" and "decimal ratio" in

arithmetic; the organs of the body in anatomy; the engine in physics; the particular element in chemistry; the character, the scene, and the action in literature; the process, the figure, and the data in mathematics — is it possible for him to “learn” in the practical sense of the word.

Likewise, in the teaching of habits and skills, it is desirable, if not absolutely necessary, to experience adequate imagery. Economy of learning is effected only when the learner has in mind a fairly clear idea or copy of what he is to do. If the pupil's experience has been rich enough in the past so that verbal directions alone may now suffice, he has a distinct initial advantage. Only the more abstract-minded pupils, though, or those of most ready imagination, learn better through verbal directions than by demonstration. In many instances, and particularly when new processes are being presented, it is much better that the pupil be shown how rather than to be told how. Especially is this true of mechanical and laboratory processes. Any one who has attempted to learn how to drive or to repair an automobile, by following printed directions, will realize how much more effective is the demonstration by another individual.

The problem of verbalism. Not only does learning in the true sense take place only when the appropriate imagery, or proper physical response in the case of motor learning, is stimulated, but the more accurate and the more vivid the imagery the more effective the learning. Yet present-day classroom practice gives but cold comfort in this respect to the student of teaching method. Lessons are run through by teachers as if the mere speaking of words were bound to stimulate accurate and vivid images, or, even worse, as if imagery were not of prime importance in learning. It would seem as if the objective of many teachers is the reciting of words which answer questions correctly, with little regard

to whether or not the pupil has any adequate understanding of the words recited. In some instances even where the pupil has grasped the idea, has experienced adequate imagery, and has retained the significance of the subject-matter, if he describes his images in words of his own which do not correspond in detail to those of the book, his efforts are not appreciated by the teacher. Genuine learning is thus discriminated against by some teachers in favor of an outward appearance of learning — the reciting of words learned verbatim, or nearly so. None too frequently do even good teachers probe behind the spoken words to discover what actual learning has taken place.

Ruediger, in an excellent discussion of the problem of verbalism given in his *Vitalized Teaching* (pages 5, 6), cites a confession of a public school teacher, a pupil in one of his classes, who declared that she had learned, only two years before, that Palestine was on earth, as she had always thought it was in Heaven; and again of a girl from one of the larger high schools in Virginia who was surprised to learn, a year after graduation, that the Cæsar of the Latin class, the Cæsar of the English class, and the Cæsar of the history class were one and the same person.

Causes of verbalism in the schools. This memorizing of words, rather than the mastering of ideas, we speak of as verbalism. Unfortunate as the present prevalence of verbalism in instruction may be, it is not surprising that we find so much verbal teaching in our schools. In part it is a natural outcome of the poor preparation in subject-matter and teaching methods of many high school teachers; and in part it may be due to a somewhat natural tendency that, when any institution becomes highly organized, its procedures and content tend to a degree to become ritualized and formalized. The form tends to take the place of the substance.

As long as experience can be transmitted directly there is little loss in the transfer; but when it becomes necessary to reduce the experience to words, especially printed words, the way is paved for a loss of vividness and accuracy. The schools of to-day are concerned largely with the attempt to revive experience as recorded in words and books, that it may relive in the minds of the pupils. This calls largely for a transformation from symbols to imagery, and often this is but poorly effected. While verbalism in teaching is thus encouraged by the necessary substitution of symbols for ideas in recording and transmitting knowledge, the failure to make this organized subject-matter meaningful to the pupils may be prevented by expert teaching. Altogether too often, though, the teacher is not a master of the subject taught, and is dependent, to a very regrettable degree, upon the textbook he uses. He has little to add to its contents. He does not have in his own mind clear and vivid images and understandings, and in consequence is not likely to stimulate such in the minds of his pupils. It has been because of the somewhat general prevalence of this condition that our State legislatures have passed legislation requiring new teachers to be better prepared for the work which they are to do.

The overcrowded curriculum has also contributed something to the encouragement of verbalism in instruction. In order to cover all of the subjects, they must be run through rapidly. Not much time may be spent in elaboration, and yet just that is needed to stimulate the images necessary for the expected educational results. Take history as an illustration. Events, men, movements, battles, periods, and reigns succeed each other in such rapid, kaleidoscope fashion that few may be really imaged, much less fixed. Textbooks have tended to become encyclopædias, often with a dozen or more items of information to a page. As

the amount of material to be taught will continue to multiply, the situation will not improve until such a time as curriculum-makers and textbook writers make wholesale eliminations, so that what is left may be the better pictured and appreciated and learned. In the meantime, teachers will have to exercise their judgment as to what may be passed over lightly, and what should be emphasized and made clear.

Increased need for visual aids. The extent of the loss accompanying the transfer of images through the medium of symbols varies much with different individuals. For a small select few the abstract word will usually be sufficient to stimulate the desired imagery leading to learning. For these, concrete illustrations would be a waste of time, and be merely making the obvious clear. If only this type of pupil came to our high schools, verbalism in teaching might be a virtue rather than a misfortune.

However, as the high school population has grown much faster than has the population of the country, while the percentage of people of high-grade intelligence has remained approximately constant, the proportion of these gifted individuals in the high schools has greatly diminished. There is little reason to doubt that the greatly increased enrollment has been recruited in large part from lower levels of "book intelligence." We are faced then to-day with the situation where the old verbal type of instruction still tends to dominate school instruction, but where, because of the changing level of learning ability of the pupils, it is decreasingly effective as a teaching method. This change in character of the high school population, and the consequent change in the relative ability of the pupils to learn from printed symbols, we have tried to meet by the introduction of new teaching methods. One of these, and the one which we shall consider in this chapter and the one immediately

following, is the use of visual instruction as a teaching aid. In doing this we have merely adapted to school needs the methods which the commercial world, the press, and the theater have produced and used.

Visual instruction out of school. The commercial world discovered long ago that one of the most effective and universal means of appeal is through pictures, charts, and diagrams. In any issue of one of our national periodicals, in which the most successful advertisers of this country concentrate their efforts, the percentage of space given over to pictures and other non-verbal media of communication is quite high. Advertising experts have learned, through continued and carefully studied experience, that pictures and diagrams pay. They have learned that it is essential to reduce the reading material to a minimum that more space may be given to non-verbal material; that pictures attract attention where printed words will not; that the message they wish to give can be most economically delivered through drawings and pictures; and that the impressions produced by these means tend to be more permanent.

The labor and expense consumed in the dressing of windows by retail merchants, the rapid growth of the pictured bill-board, and the great use of pictures in the education of workers in industrial and commercial concerns, all alike testify to the efficacy and power of visual instruction. One has only to look over, too, the comic strips in the daily newspapers, with their poverty of genuine wit or humor, and then consider their large and regular circle of readers, to understand the enormous appeal made by graphic means. Only by means of pictures could the monotonous and barren content of the so-called "funny page" obtain an appreciative audience. Reduced to words alone, the content of these pages would attract little if any attention. The moving picture, too, with its predigested thinking and

often highly sentimental plot, competes successfully with the press, the church, and the school.

2. *Values of visual instruction*

As a means of stimulating adequate imagery. The excessive reliance placed upon verbal means of stimulating imagery has tended to displace not only direct visual experience, but all types of direct sensory experience — auditory, olfactory, gustatory, tactile, kinæsthetic, and organic — as well. Perhaps we should broaden the subject of this chapter to include these, and speak of *sensory* instruction rather than merely *visual* instruction, as contrasted with verbal instruction. However, the possibilities of experiencing history, English, science, mathematics, and other school subject-matter by these other sensory avenues are considerably limited as compared with the possibilities of visual instruction, so the term visual instruction, which we have chosen for this chapter, is perhaps quite proper after all.

The technique of other sensory instruction, too, has not yet been worked out, and, whatever the possibilities of presenting subject-matter in the school through these other avenues may be, the practical limitations placed upon the educational process render the wide use of them an impossibility. Perhaps, too, with few exceptions, these other images are not in any sense as essential for the attainment of educational objectives as are visual images, though no doubt something would be added to in realness, in some subjects, could they also be stimulated directly. The fact is, though, that the possibilities of experiencing subject-matter by other senses than the visual are comparatively small in number. The technique of visual instruction, too, has far outstripped the technique of education by means of other sensory impressions. Accordingly the discussion of

this chapter will be confined to visual instruction, reserving the privilege of occasional reference to auditory and other sense impressions, where such seem opportune and practical.

Advantages of visual instruction. Some one has said that there are four approaches to the learning about a given thing, namely:

1. Studying the thing itself;
2. Studying a picture or representation of the thing;
3. Being told about it; and
4. Reading about it;

and that the effectiveness of the approach is in the descending order. It is quite possible that this is not always so, especially as to the relative position of 3 and 4, but, in general, there is much truth in the statement, and the reasons for such being the case are not hard to see.

Accuracy of image. In the first place, what is invoked by the written or spoken word is quite variable, and probably in most cases varies widely from the imagery of the author of which the word is the expression. No amount or quality of verbal description can paint the visual appearance of beings or objects so as to invoke images which are exact likenesses of the thing being described. However vivid and detailed such invoked images may be, they differ not only from each other in the case of different individuals, but also from the actual subject.

For example, there is no possible verbal means by which I can cause the reader to experience the sight of my study, as I see it at this moment, as well as would be done by visualizing it from a good picture of it. Were I able to describe each detail quite accurately, the images aroused by my first few sentences would have faded from consciousness before I could possibly reach all the other details. The numerous and complex relations between all these, I might never be able to describe.

Vividness of image. Ordinarily, images aroused by words are less real, less intense, and more feeble than those resulting from direct sensation and perception. For example, no description of mine can impress you, as I was once impressed, with the sight of nearly 100,000 people attending a California-Stanford football game. An accident witnessed, or a drowning or a murder seen, has a vividness to one present that can never be conveyed to one not there. Living beings and real things in themselves have possessed significance for us for so many thousands of years, and their symbols for such a few centuries, that our attention is attracted and our emotions and interest are aroused by living beings and real things and their likenesses much more quickly and much more profoundly than by the symbols which stand for these real things, or for living beings and their thoughts. Only as appropriate previous experience enables one to revive and reconstruct images approximating the events or the things which the symbols represent, can one approach the vividness of image as experienced through direct sensation and perception.

The vividness of an image depends not only upon whether the image is one resulting from direct sensory experience or is merely a revived image, and not only upon the intensity of the stimulus itself, but upon the attitude of the learner; upon the place of preference given the stimulus in the scale of values of the learner at the particular moment; and upon the interest and attention of the learner. There can be little question but that for young people, especially, real things are more interesting than verbal symbols. Pictures, drawings, diagrams, and films will be attended to with much more unity of attention than will the printed page. How long this condition would persist if all school work were by visual means, and the novelty thereby eliminated, it is hard to say.

Economy of time. Not only may more accurate and more vivid images be experienced through visual instruction, but the images may be stimulated much more quickly. The exposure of a picture for a few seconds will often produce more accurate and more vivid images than will a verbal description involving several pages of print or several minutes of talk. So obvious and general is this principle that there seems no need for further discussion of it.

Permanence of retention. Visual means of presentation insure more permanent retention than do verbal means, though to what extent this is true is yet to be definitely settled by carefully conducted experimental investigations.

Experiments so far made have given less support to the claims for superiority of the visual means than was to have been expected. We are now beginning to possess good experimental evidence which has been gathered under actual schoolroom conditions, and with school pupils engaged in school work. This demonstrates the superiority of visual instruction as to permanence, though depending somewhat upon the nature of the material. Demonstration and film methods of presentation have been shown, for example, to be quite superior to verbal methods in presenting some types of material, but not superior to other means of presentation with other materials.

The conclusion that may be drawn, from the experiments so far performed, is that the relative effectiveness of verbal instruction, as contrasted with the various forms of concrete experience represented in visual education, depends on two major conditions:

1. The nature of the instruction to be given, and
2. The character of the pupil's previous acquaintance with the objects which are dealt with in the instruction.

The claim that visual instruction is uniformly more effective than verbal instruction is not supported by experi-

mental results. Rather, it seems that either may be more effective, depending upon certain factors, including the two mentioned above.

Value of visual material as a supplementary device or aid. One should not entertain the idea that whether visual material is to be used or not depends upon whether it can be established that visual instruction is superior to verbal instruction. There is no reasonable doubt that there are many occasions where a distinct gain may be realized by employing visual aids in instruction that is predominantly verbal. For example, *Ivanhoe* will be much better understood, and will be more real and more interesting, if the pupils studying it have seen pictures of a castle with its surrounding moat and a drawbridge. At least for many unimaginative pupils, it is desirable to use visual aids to give them a sufficiently large and rich store of imagery.

Selection of materials for visual presentation. While it might be true that a good visual reproduction of an idea, a place, a thing, a being, a movement, or a combination of a number of such might be more effective as an educational stimulus than verbal symbols, it is quite clear that certain materials of education lend themselves to being presented visually better than do others. As Freeman has pointed out in his recent careful study of the whole question, the very constitution of many motion-picture films indicates that it is difficult if not impossible to represent some subjects, or some aspects of subjects, by means of pictures alone. In commercial pictures for entertainment this obstacle is overcome by means of "titles"; in educational films verbal discussion and explanation is resorted to frequently, and sometimes at length.

Then, too, it is obvious that the possession on the part of the learner of concrete experience with the objects or ideas presented tends to lessen the need for visual presentation.

The following is quoted from the report of Dr. F. N. Freeman (*Visual Education*, page 71) on the experiments conducted by himself and his associates:

In James's experiment, oral instruction proved to be relatively effective in the preliminary experiment with the film, *The Queen of the Waves*, and in the later experiment with the films, *Yellowstone Park*, and *Toads*. On the other hand, oral instruction was clearly less effective in the case of the films, *A Woolen Yarn*, *Cuba*, *The Isle of Sugar*, *Lumbering in the North Woods*, *The Mosquito*, *Through Life's Window*, and *Waste Disposal in Cities*. The first group of films describes objects or processes which the child can understand or interpret in the light of his past experience. For example, *The Queen of the Waves* deals with the development of the forms of water conveyance — the log, raft, dugout, canoe, sailboat, etc. The children had doubtless either seen all these objects, or at least pictures of them. *Yellowstone Park* deals with forms of natural scenery, which are sufficiently like objects they have seen to be comprehended from a verbal description. Similarly with the film, *Toads*. The second group, on the other hand, deals with detailed processes, such as those of manufacture, or with more or less intricate or abstruse biological facts, such as the development of the mosquito or the structure of the eye, which the child cannot picture in terms of his previous experience.¹

3. Limitations and dangers of visual instruction

Indiscriminate use of visual materials. It is interesting, even if not particularly instructive, to read the unsubstantiated claims of the enthusiastic missionaries in the cause of visual instruction. Thomas A. Edison is reported to have given a statement to the press, some time ago, that the time would soon come when practically all instruction in the school would be by visual means. Others have made general statements to the effect that the efficiency of the visual type of learning is double, or fifty per cent as much again, or fifteen per cent to forty per cent more, than the

¹ Quoted by arrangement with the publishers, The University of Chicago Press.

oral or silent reading type. Equally absurd, and perhaps even more wrong, are those who have characterized visual instruction as another fad, just a spectacular novelty, and another way of wasting public money and making school work too easy.

Just as certain as that visual instruction, in many instances, is a desirable and an effective means in teaching, is it that the relative efficacy of visual instruction varies from situation to situation, and that no general statement as to its relative efficacy in terms of the percentage of superiority can truthfully be made. Not all things can be presented visually, and not all things need be. Not all things should be, either, even if they could be presented more conveniently by visual means. While in most instances visual presentation is more economical as to time, it is not always so.

Not all types of visual instruction, either, are equally effective for a given unit of instruction. Classroom demonstration has been shown to be superior to the films with certain types of material to be taught. Under certain conditions, the stereograph seems to be superior to either slides or films. Visual materials of the keenest interest, too, may be of less educational value, for some types of material, than is book instruction. If the visual materials are not well adapted to the intended use, they may also fail in effectiveness. One of the handicaps attending the proper development of visual instruction in the schools, as in the case of supervised study, the project method, the socialized recitation, and the use of tests, is the enthusiastic but unintelligent use of films and other visual materials on the part of teachers who would like to be classed as progressive workers.

Faulty technique in using visual aids. Certain useful types of visual materials, too, have been brought into dis-

repute because of the imperfect technique of the teachers employing them. Motion pictures in the schools have not always been used intelligently, and the educational results in consequence have in many instances been disappointing. Pupils fail to note the critical and important things shown, and their attention is given to more interesting but less educative details or phases. Films, too, are often poorly selected and poorly shown, interest is lacking, and disorder sometimes results during the "running."

Field trips miscarry, time and time again, due to poor advance preparation and unskilled management. Slides fail to carry their message or to arouse interest because of inferior explanatory technique. However, failures of this type should not be charged against visual instruction as such. As teachers come to use visual aids more and more, the errors made in their use will naturally tend to be eliminated. Skill in visual instruction requires practice, as does skill in any other type of teaching. Technique and materials, too, will tend to become standardized as more attention is given to this method of instruction.

Small amount of thinking required. Some one recently remarked that one should check his brains at the moving-picture theater door, and that about the same could be said for the use of visual instruction in the schools. One must not think of visual instruction, though, as being confined to the use of films alone, or even of films and slides. The blackboard, maps, charts, field trips, the stereograph, models, and demonstration work are all visual aids; and the use of any of them constitutes visual instruction. Whatever objections may be applied to any one type of visual material should not be charged against all other types. It is often claimed, too, that it is wrong to rely upon pictures, slides, objects, and other means of making ideas concrete, because they remove the necessity for abstract thinking,

develop superficial thinkers, make school work too easy, and remove the opportunity for the training of the imagination.

Such statements are somewhat difficult to substantiate. That blanket denial facilitates the development of thinking power or the imagination is certainly debatable. Passing over the question of whether the prevailing type of verbal lesson, with its emphasis upon memorized information and its catechetical method of procedure, contributes a great deal to training in thinking or in developing the imagination, it can hardly be said that the proper use of visual materials need displace thinking in the schools.

One of the conditions of good thinking is the possession of a large variety of clear-cut concepts and images. No amount of skill in method of thinking or in native thinking power can be substituted for these. Likewise imagination, which is involved in thought, depends directly upon the possession of materials in the way of rich, varied, and clear-cut sensory images, as well as the ability to reconstruct other images from those which have not been directly experienced. No one can imagine a rose as large as a cart wheel unless one has experienced a rose and a cart wheel. One can image the future conditions and developments of people, things, or events not actually experienced only in terms of people, things, or events that have been at some time directly experienced. The very process of thinking and imaging depends upon and is facilitated by the possession of adequate imagery, and this can in many instances be best gotten from concrete visual stimuli.

Weakens language training. It is also pointed out that the use of visual and concrete materials in teaching tends to displace books, and it is claimed that a natural consequence of this is the automatic removal of opportunity for training in the use of language. Here again one must inquire into

the actual psychology of the situation, or one may be misled by the apparent weight of this objection. John Dewey has pointed out that one of the chief values of language is its contribution to thinking; that through the individualizing of ideas, concepts, and thoughts by means of definite symbols, thinking is facilitated. One must also be mindful of the fact that the more clearly the individual has in mind that for which the symbol stands, the more accurate and clear the thinking he does will be. It is not to be supposed that the use of visual aids will displace any considerable proportion of verbal teaching. Rather visual instruction will supplement verbal teaching, and be used in connection with it. It is not a question of whether we shall have verbal or visual instruction, but whether we shall have verbal instruction with or without visual instruction.

Yet it has been suggested that if visual materials are used, whenever it becomes difficult to convey ideas through words, there is removed the incentive and the necessity for that refinement of expression and that development of verbal skills which is necessary for language perfection. Perhaps there is something of merit in this objection, but it seems disproportionately small when compared with the ineffectiveness of verbal instruction as measured in terms of the subject taught.

Objections to the use of films. The foregoing objections have been aimed at visual instruction in general. There are other objections advanced which apply only to the use of moving pictures. Among these are:

1. The danger of eye-strain.
2. Increased fire hazards, and increased expense of insurance.
3. Lack of available films, adapted to school instruction.
4. Expense for installation, and use of the films.
5. Influence exerted upon pupils to patronize the commercial moving pictures.
6. That the film is not as effective as slides and still pictures.

It is difficult to settle definitely some of the questions raised by these objections. No one knows just what the effect upon the eyes of pupils will be from the use of films in the classroom. It is certain, though, that whatever the effect may be it will not produce any serious injury without warning. No serious case has been established against the amusement "movie" in this respect. It is doubtful if, for at least some time to come, sufficient classroom use of films will be made to make this issue a practical one.

The increased danger and expense from fire hazards is hardly any longer a meritorious objection. Most new high school buildings now have special moving-picture booths, while safety appliances and the use of non-inflammable film have reduced danger from this source to a negligible item, and insurance rates have been adjusted accordingly.

Educational films now available. It is quite true that the supply of films for educational purposes available as yet leaves much to be desired. The supply of educational films does not meet the school needs. In addition it is alleged that many of these are untrue, vulgar, and crude, and that their educational values are obscured by the more interesting details. This has been so because at the outset there were no films produced for school room purposes alone, and instructors in consequence were dependent upon commercial films having some educational values. This situation is rapidly changing, and to-day hundreds of films are each year being produced with educational uses primarily in mind.

Already several journals have entered the field of visual education (see bibliography at the end of the chapter), and in each issue of these a score or more of concerns are using space to advertise the sale or rental of educational films. Many of these are written and filmed to fit into definite units of standard elementary and high school courses of

study. Progressive teachers and schools are beginning to subscribe for these journals, and to keep abreast of the development of new materials for instruction.

Recently there have been produced, under the auspices of the history department of Yale University, a hundred reels of excellent films, depicting the history of the United States. In many States the State university and the college of agriculture are establishing, through their extension divisions, bureaus of service which distribute films to schools throughout the State. Usually these bureaus are building up collections including hundreds of films and sets of slides, and these they loan to the schools at no cost other than the transportation charges. In addition to such collections, films may be obtained from commercial companies at a reduced rental and for limited periods of time, as thirty, sixty, or ninety days. These may be circulated among the schools of the State, and the cost to individual schools considerably reduced. In addition to these sources, an ever-increasing number of commercial and industrial corporations are preparing films relating to their business largely for purposes of advertising, to be sure, but which are quite valuable for educational purposes as well. A recent bulletin of the United States Bureau of Education, prepared by A. P. Hollis, lists a number of such companies, with their addresses. These films are obtainable free, or at a small cost. The complete title of this publication is given in the references at the close of the chapter.

Films to parallel courses of study. Whatever may have been the lack of films for educational purposes in the past, the situation now is improving rapidly. Highly valuable films, usable for the illustration of regular daily class work, are now appearing in such large numbers that the objection of lack of a proper supply is rapidly losing its force. To be sure, it still requires some effort to locate and obtain the

films that are available, and only the more industrious, thoughtful, and ambitious teachers are as yet able to arrange sufficiently in advance for the use of any considerable number of them. The work of the service and extension bureaus of State higher educational institutions and State departments of education, and the establishment of local city and county bureaus, and libraries of educational films, will in time do much to make their use easier and less taxing on the resources of the individual teacher.

Without doubt the time will soon come when films will be arranged to coördinate with the courses of study, and it will not be necessary for each teacher to search the literature for available films to use in his various courses. At the present time, though, it is still necessary for the teacher to do some looking around. He should investigate the possibilities of his State institutions of higher learning, maintain a list of films available from the various distributing and renting concerns, and keep abreast of new productions through announcements in the appropriate journals.

Expense for films. A quite serious obstacle in the way of the use of films has been the expense involved. The expense of the original equipment is not great, as the projector is not now a prohibitive item and is incurred but once by a school. A good portable projection machine may be purchased for as small an amount as \$225. Since it may be of service to every department of the school, including assemblies and entertainments, and is likely to be of service almost every day in a large school, an expenditure of that amount of money is a good outlay. Compared with laboratory apparatus, employed only once or for a few short periods each year, or with library books used but seldom, it is not a large expense to incur.

In large schools the expense for films is not prohibitive.

A film may be used in a number of classes and for hundreds of pupils during one rental, or the film may be purchased outright at a negligible per-pupil cost. In the smaller cities and towns, though, and especially in the country districts, the expense is of such consequence that only through the coöperation of a number of schools, or a county unit of use, can any adequate quantity of films be financed.

The idea of spending money for moving-picture films is as yet new to both school boards and taxpayers, and progress in their use will have to be made somewhat slowly. The use of films also smacks too much of entertainment at public expense. For this reason teachers and principals must be particularly careful, at the outset, to choose only such films as are definitely educative, and preferably those which are used definitely in connection with school subjects. It is hard to provide school boards and school patrons with proof as to the increased effectiveness of the instruction which may result from the use of the newer methods of teaching, since there are almost no means of measuring results in terms which the average layman can visualize and appreciate. The judicious and gradual introduction of films as a medium of teaching, though, will gradually pave the way to the acceptance of expense for them as legitimate and profitable, along with that for library books, laboratory apparatus and equipment, and supplies for work in the household and manual arts.

Educational films and the "movies." It has occasionally been claimed that the introduction of educational films into the schoolroom will operate to awaken children to the possibilities of the "movies" as a source of entertainment, and thus whet the appetite for more and more thrilling pictures. The school will thus pave the way to the moving-picture theater for many children who otherwise might not have developed the habit. On the other hand, there are

those who feel that the school film may be made in part to replace the downtown commercial entertainment. Some of our schools have already gone so far as to offer evening "movies," and thus to compete directly with the moving-picture theaters of the town in the hope of substituting good or harmless films for the harmful type so often shown in the public moving-picture house.

It is difficult to find much force in either of these arguments. The fallacy in the first seems obvious, and the chances of success of the school "movie" as a competitor with commercial films, except under the most favorable circumstances, are extremely slight. The expense involved in meeting the quality of the downtown entertainment is prohibitive, and, were it not, youngsters probably would still prefer to go to the "regular" show.

Films vs. slides. Not all school people have been convinced that the film is a more effective means for teaching than the slide and other forms of still pictures. They insist that there are opportunities afforded for observation in the still picture that are not possible, or at least not so easy of realization, in the showing of films, and that the still picture permits of explanation and discussion that the film does not afford. We will leave the discussion of this point to the next chapter, where we deal with the technique of using both films and slides.

4. Equipment needed for visual instruction

Projection equipment. Every high school should own, as a part of its regular equipment, at least one modern stereopticon or other satisfactory projection machine for the purpose of projecting "still pictures." These may be obtained at prices ranging from \$50 upward, depending upon the quality of the machine. With a corps of modern teachers such a machine would be in operation every day.

As compared with the expense for much laboratory apparatus, which remains unused a great portion of the school year, the expenditure for this very useful piece of equipment is relatively small. While fairly satisfactory stereopticons may be obtained for as low as \$50 or thereabouts, it is actual economy to purchase a better machine. One of the most popular models of a widely used type of stereopticon sells for about \$175. Such a machine will project satisfactorily for a distance of fifty feet, and is useful for assembly as well as for classroom purposes. If only classroom use is desired, a smaller machine will be found satisfactory. Still much more convenient for classroom use is a new type of machine for daylight projection apparatus. This projector may be employed without any adjustment of blinds.

Whatever type of machine is used, it should possess an attachment for the projection of opaque material. With such an attachment, postcards, diagrams, pictures from books and journals, and in fact any printed material of a size not too large, may be projected upon the screen or wall. This service increases many fold the available material for projection. Attachments are also available for the projection of microscopic slides.

Among the most promising of recent developments are the film-slide projection machine and the attachment for stereopticon machines by which film slides may be shown. The low cost of such projectors and attachments and of film slides makes it possible for every school to make use of them.

In a high school of several hundred pupils there should be one motion-picture projector, one stereopticon for large halls, and several smaller projectors with opaque attachments for classroom use, the number depending upon the demand made upon them. This will vary with schools, as many teachers are not as yet accustomed to operating

projectors. However, the skill required to operate both a stereopticon and a motion-picture projector may be acquired with a few hours' practice, and with a little practice teachers will soon acquire skill and confidence.

Other equipment. In the teaching of science a number of visual devices may be employed to advantage — models of engines, drawings, charts, etc., for physics; and collections of mounted specimens, anatomical charts, and mounted slides for microscope use for the biological science, suggest themselves. These may be purchased from supply companies, but every science teacher should know how to mount specimens and make microscopic slides. Charts may be prepared by the instructor and capable members of the class, and preserved for future classes.

No teacher can teach history most effectively without the use of maps. Every high school maintaining a complete history department should own a complete set of maps especially prepared for the teaching of American history, and a similar set for each course offered in European history.

Every classroom should have blackboards on at least three sides of the room, and should contain a space of ten to twenty square feet which may be used as a bulletin or exhibit board.

Filing cabinets should be available for teachers who desire to make collections of pictures, postcards, railway folders, or other visual material for use in teaching their subjects.

Having now considered the need for visual aids in instruction, the values and limitations in the use of such, and the equipment needed for visual instruction by an average high school, we shall next pass to a consideration of the selection of visual materials for use and the general technique to be employed in using them.

QUESTIONS AND EXERCISES

1. What are the evidences of verbalism in teaching, as history is usually taught? English? Mathematics? Foreign languages? Science?
2. List all the causes which you can think of, for verbalism in the school.
3. List the points of strength of visual instruction, in the order of their importance.
4. Examine and evaluate each of the objections to visual instruction. Which are temporary, which are avoidable, and which are based on inherent limitations of visual instruction?
5. For what classes of pupils do you think visual instruction is especially needed? Do you think it is needed more than a generation ago? Give reasons for your answers.
6. Consult a number of recent issues of journals devoted to visual instruction, and note what films or other visual material, described in the articles and advertisements, are suitable for use in your teaching subjects.

SELECTED REFERENCES

- Bureau of Commercial Economics, Washington, D.C. *System of Loaning Films for the Purpose of Instruction to Universities, Colleges, etc.* 1915. 2 volumes.
- Dorris, Anna V. "The Training of Teachers for Service and during Service in the Use of Objects and other Visual Material"; in *Educational Screen*, vol. 2, pp. 333-38. (November, 1923.)
- Ellis, Don C., and Thornborough, Laura. *Motion Pictures in Education*. Crowell & Co., 1923. 364 pp.
Comprehensive discussion of motion pictures as a means of education; history and technique of picture construction. List of available films.
- Freeman, Frank N., and others. *Visual Education*. Chicago: University of Chicago Press, 1924. 391 pp.
A comparative study of motion pictures, and other methods of instruction, by careful experimental method.
- Goode, J. Paul. "Scope and Outlook of Visual Education"; in *Visual Education*, vol. 1, pp. 6-13. (April, 1920.)
- McCluskey, Frederick D. *The Place of Moving Pictures in Visual Education*. Chicago: University of Illinois, Educational Research Circular, no. 20. (July 16, 1923.)
- National Academy of Visual Instruction. *Proceedings First Annual Meeting*. Madison, Wisconsin, July 14, 15, and 16, 1920. (J. V. Ankeny, Secretary, University of Missouri, Columbia, Mo.)

Ruediger, Wm. C. *Vitalized Teaching*. Boston: Houghton Mifflin Co., 1923.

Chapter I, "The Problem of Verbalism"; Chapter II, "Exhibiting Subject-Matter."

Sumstine, David R. "A Comparative Study of Visual Instruction in the High School"; in *School and Society*, vol. 7, pp. 235-38. (February, 1918.)

Visual Instruction Magazines.

Educational Screen, 5 South Wabash Avenue, Chicago, Illinois.

Visual Education, 327 South La Salle Street, Chicago, Illinois.

CHAPTER VII

TECHNIQUE OF USING VISUAL AIDS

1. *The selection of visual material:* Types of visual aids — Factors to be considered in determining what aids to use — Experimental data as to relative effectiveness of visual aids — Need for further experimental evidence.
2. *General technique of visual instruction:* Occasions for visual instruction — Preparation of the pupils — Preparation of materials — Follow-up work — Differences in technique for different types of material — Uses of visual material by pupils.
3. *Instruction by means of projective apparatus:* Selection of films — Technique in using films — Slides and opaque projections — Increasing use of slides.
4. *Visual instruction outside the classroom:* The field trip, or excursion — Preparation for trips — Suggestions on technique of excursions — Places to visit — The vocational and manual subjects.
5. *Other visual classroom aids:* The stereograph — Technique of the use of the stereograph — Maps and globes — Charts, graphs, models, and diagrams — Demonstrations and dramatizations — Use of specimens, relics, and collections — Pictures — Use of the blackboard — Exhibits.

Questions and exercises — Selected references.

1. *The selection of visual material*

Types of visual aids. Some teachers make the mistake of thinking of visual instruction only in terms of the showing of films, or of films and slides. Instead there are a score or more of types of visual materials that may be used. Among the most readily available and usable are:

Films	Pictures	Globes
Slides	Specimens	Demonstrations
Opaque projection	Relics	Dramatizations
Charts	Samples	Museums
Maps	Collections	Sand Tables
Display racks	Diagrams	Graphs
Stereograph views	Bulletin and Exhibition boards.	

In addition to the above there is the boundless material that may not be brought within the schoolroom, but to which the pupil may go on a field trip, or an excursion, or by way of private investigation.

Factors to be considered in determining what aids to use. What type of material should be used by a teacher as an aid in instruction will of course depend upon factors which will vary from situation to situation, such as:

1. The degree to which the type of aid is adapted to the subject-matter being taught. Maps, for example, are peculiarly valuable in the teaching of geography; demonstrations are very useful in science and physical education; specimens and field trips come in naturally in botany; stereographs where the third dimension is important; and films where the portrayal of action is the desirable element.
2. The availability of the material. Films or slides may not be readily obtainable; seasonal or weather conditions may make field trips or excursions impractical or impossible.
3. The amount of time involved in the presentation of the material.
4. The importance and need for visual presentation of the material being presented. Not all material is of sufficient importance or difficulty to warrant the expenditure of time and energy necessary for visual presentation.
5. The relative effectiveness of the material.

No one can lay down a measuring stick or scale for determining the degree to which proposed material is adapted to the aims of instruction or to the subject-matter at hand, or by which one can tell whether or not the time required for a given type of visual instruction is warranted by the probable results. The same may be said with respect to the others of the five factors mentioned. Yet we must bear these criteria in mind, using our best judgment in deciding as to the method of presentation. There is no need to bring objects to the classroom when a diagram on the blackboard will serve the purpose, or to take a class on a field trip when

a picture or specimens will do equally or even approximately as well. It is also unwise to take time in class to perfect imagery on non-essential and minor points.

Experimental data as to relative effectiveness of visual aids. As to the relative effectiveness of the different types of visual material which may be used, we are as yet largely dependent upon our judgment and experience. There will slowly accumulate a supply of scientific data on the question. Already we may draw upon the conclusions of a few carefully conducted experiments. Such of these as we have all point to the general conclusion that the relative effectiveness of the different types of visual methods and materials depends upon the nature of the subject-matter to be taught, its content, and its aims.

The recent investigation of visual instruction, carried on by Dr. Frank N. Freeman and his colleagues at Chicago, gives results which are helpful in this respect. As illustrative of their findings, McCluskey, in a carefully controlled experiment, found the film inferior to the oral and map method of teaching French explorations in United States history; the film inferior to the chalk talk in teaching about mountain glaciers; and the film inferior to the oral-chart method of teaching material concerning waste disposal in cities. He found a stereopticon lecture more effective than the film in teaching the significance of the Panama Canal. He found oral instruction illustrated by stereopticon slides, and oral instruction illustrated by pictures and sketches, approximately equal to film instruction in dealing with the life-history of the Monarch butterfly. He found stereographs slightly superior, and films much superior to slides in teaching matters concerning steamboats in United States history. James found the film superior to still pictures in teaching matter concerning Yellowstone Park, and lumbering in the north woods. The two McCluskeys found

demonstration superior to the slide, the film, and the stereograph in teaching how to make a reed mat, the slide being the least effective in most instances. Rolfe found the demonstration clearly superior in teaching lessons on static electricity. Freeman, Shaw, and Walker found the film superior to the ordinary oral and demonstration methods of teaching handwriting.

The general net result of the experiments conducted to determine the efficacy of the film, as compared with other types of visual aids, was stated by Freeman as follows:

The comparison of the motion-picture film with other visual aids — slides, stereographs, still pictures — as means of informational instruction, indicates that the motion picture is superior within a restricted range of subjects, and that outside this range of subjects the older devices are as effective or more effective than motion pictures.¹

Just exactly what the field of the film in the future will be no one may as yet say, though Freeman points out there is no question but that, where motion or action is among the essentials of the content to be learned, as in a demonstration of how to do a certain task, or in illustrating the operation of steamboats, the film is more apt to be effective.

Need for further experimental evidence. In addition to the peculiar fitness of the film in the presentation of particular types of material, such as motion and action, it also operates to attract and hold the attention better than do still pictures or other still types of material. In considering this latter value, namely, the degree of interest, it is wise to consider also that attention to still material may be stimulated by other means, such as motivated assignments, and that still types of visual material have also their peculiar advantages. Among these are opportunities for sensing details, opportunity for fixation, opportunity for

¹*Visual Education*, p. 87. The University of Chicago Press.

supplementing the sensory content with reflective thought and varied associations, opportunity for raising questions, etc., as well as possibilities in the way of color and the third dimension, and opportunity for accompanying the demonstration by lectures and explanations. It is no doubt due to the operation of these advantages of still types of material that the peculiar advantages of the motion picture have been offset, and that, on the whole, the film on the one hand and other visual aids on the other tend to be of approximately equal value, as shown by information tests given at the close of the experiments.

Most of the experiments carried on in this group of investigations have measured efficacy in terms of information acquired. What may be the relative value of the various types of visual presentation, or of visual accompanied by verbal, is still open to conjecture. The difficulty of measuring the contribution of units of teaching to ideals, attitudes, and interests is so great that an experimental, quantitative determination of relative values lies as yet far ahead of us. It is not unreasonable, however, to suppose that the film, with its possibilities of action, movement, and the putting of life into its characters, will exert a greater influence on the emotional side of education than types of presentation not possessing these possibilities.

2. General technique in visual instruction

Naturally, the technique of presentation of each type of visual material will vary somewhat from that for the presentation of any other type, yet there are certain common procedures which we will mention here, and which we will not repeat in our discussions further on. These relate to preparation for and use of the visual materials.

Occasions for visual instruction. The first thing for the teacher to keep in mind is that the use of any type of visual

material should be for some definite teaching purposes. The teacher who wishes to strengthen the quality of his instruction by the use of visual and concrete material should not merely set out to use more of it, indiscriminately. Such materials should have certain definite functions to perform, and their use is accompanied by certain peculiar advantages and disadvantages which should guide the teacher in determining when to employ them, and the procedure to be used.

The most frequent need for concrete materials comes from the lack of adequate imagery on the particular subject on the part of the pupils of the class. The appearance of objects, people, and scenes not already familiar to pupils, especially those of foreign countries, or of ancient or mediæval times, often needs to be presented to the pupil visually. Again, in studying plants, animals, industries, and buildings, it may be that ideas as to these can be adequately given the pupil only by such visual means as pictures, slides, films, and stereographs, or by having him see the object itself. Where the pupil is able to imagine such things with considerable accuracy and vividness because of previous actual or vicarious experience, or where accurate imagery of these things is not essential, the effort and time involved in trying to make the image concrete may not be justified.

Visual materials should be resorted to only when the subject presented is such that the pupil does not have an adequate apperceptive basis, or where the pupil possesses appropriate imagery, but where there is need for vividness obtainable by fresh experience and not by revived images. Very often the approach to a new topic or subject may be made more attractive and more interesting by the use of concrete materials. Given an interest in a problem, and an encouraging start through interesting and vivid material, the pupil is likely to suffer less from the verbalism necessary to further instruction in the subject.

A third type of opportunity for the effective employment of visual aids is in summarizing a given unit or phase of work. So used, films, slides, and stereographs have given excellent results as teaching aids. The combined method of oral and visual presentation is better than either alone for this purpose, even where only the same class time is allowed for both the oral and the visual presentation as would be used by either method alone. The use of the films in teaching literature, and the use of the blackboard, diagram, graph, and chart are also effective aids for summarization.

Again, in lecturing, teachers should contrive to employ considerable visual material by way of illustration, stimulating imagery and permitting students to experience the content through two avenues — visual and auditory. Visual material also has its use as a means of attracting and holding attention, and as giving organization and emphasis to the points presented. It is frequently worth while, where the visual material is easily accessible, to use such merely to stimulate a flagging interest in the subject. The teacher who has a wide repertoire of method, and will employ variety with discretion, will always obtain more regular and more whole-hearted response on the part of his pupils than that one who takes all his tricks from the same bag.

Preparation of the pupils. There are some types of visual materials which may be employed without any special introduction; the setting in which they are placed suffices. Illustrative diagrams on the blackboard belong in this category. Others demand a careful preparation on the part of the pupil.

In the case of films and field trips, much waste is invited where pupils are not prepared in advance. In most cases, questions should have been raised previously upon which the film or field trip will throw light; the film or trip will then come as a natural way of supplying needed information and

ideas. Students should ordinarily know what to look for, what the purpose of the film or trip is, and what they are expected to get and to retain from it. That is, definite assignments should be made, unless it may be safely assumed that these things are understood. The failure to take proper care of this important step has led to many disappointments, both to pupils and to teachers — to pupils who looked forward to the film or trip merely as entertainment, and to teachers who found that pupils failed to see the essentials. In the use of slides, dramatizations, and stereographs, this step is usually quite essential to the best results.

The preparation of materials. One feature of certain types of visual material, operating to restrict the use of those types, is the necessity for the expenditure of considerable time and effort in advance preparation in connection with their use. In the teaching of science it is often necessary to arrange the entire sequence of the course with a view to arriving at topics when they can best be vitalized by field trips, or by the study of live specimens in the school-room. When slides or films are borrowed or rented, sufficient foresight must be exercised to arrange for the arrival of the material at the time it is needed.

Many progressive teachers, at the beginning of the year or semester, canvass the possibilities of the extension divisions of the State educational institutions, industrial and commercial concerns, and film distributors whose rates on suitable material are reasonable, and then proceed to arrange for the use of visual material along through the course. It is desirable, too, to be on the lookout for possibilities of special illustrative material which may be prepared, from time to time, by members of the class or by the instructor, such as maps, diagrams, charts, models, specimens, and the like. Even these occasions need to be planned for somewhat in

advance. Economy demands that teachers keep — in plan-books, on the margins of the texts, or on inserted leaves — a record of such material used or desirable for use, in order that the advance work for ensuing years may be lessened and the work better planned. The service and research bureaus of the extension divisions of institutions of higher education, State departments of education, and of students of visual education, will no doubt in the near future furnish many sets or groups of visual materials, arranged by courses.

Another phase of the necessary advance preparation is that of the arrangement of the materials just prior to presentation. Films or slides should rarely be shown until they have been reviewed by the instructor. Only when this has been done, and the instructor is familiar with the pictures and their desired order, can he prepare the class properly for observation and plan his own accompanying and introductory remarks. Very often much of the teaching possibilities of slides fails to be realized because the instructor has not familiarized himself with the particular slides, and has not properly planned their presentation. It should be realized and always kept in mind by the teacher that the use of illustrative material requires more careful lesson-planning than do verbal methods of teaching.

Occasionally films are received improperly rewound, and sometimes in need of repair. Slides are often received out of order, upside down, or reversed. A preview of the material will reveal these things and provide an opportunity for their correction, thus making it impossible for irritating distractions to occur during the presentation.

Laboratory demonstrations should be rehearsed in advance. Nothing is more disconcerting to the conscientious teacher, or more demoralizing to the work of the hour, than to have a demonstration go wrong, even though the in-

structor is able to say, "Well, you know how it should have turned out, anyway." Distraction and disorder, resulting in the discomfiture of the teacher and a waste of time of the class, are likely to ensue from demonstrations which are delayed and drawn out while materials are assembled or repaired during the demonstration. Such exercises offer poor examples of the teaching art, and in results are no better than the traditional verbalism.

It might be laid down as a rather general rule that most of what has been said above regarding the advance preparation for the use of films and slides and demonstrations may be applied to field trips and excursions and to the use of most types of visual instruction, the material of which and all its special educational possibilities are not familiar to the instructor. Even where the showing or trip has been previously carried out, it is wise to repeat many of the preparatory steps. New possibilities, and the refreshing of one's mind as regards old ones, make this reparation worth while.

Follow-up work. It should be borne in mind all along that the use of visual material is simply the employment of one of a number of possible types of teaching, and that its use must be regarded as such by pupils as well as by the instructor. Visual materials are employed to contribute to the effectiveness of the work at hand. Not only should the advance preparation of the class be such as most adequately to insure that the material will serve its purpose, but, in those cases where the use of visual aids consists of more than the brief illustration of a point in passing, there should be a check-up to determine how well their use has served its purpose. Where the use of visual material has been simply scattered along in verbal teaching, such as the use of graphs to give impressions of proportion of growth, or diagrams to furnish organization, the check-up on the

visual material may simply be incorporated in the usual discussions and tests of all the work — verbal, visual, and otherwise. Where, however, the visual presentation has formed somewhat of a unit in itself, as in the case of an excursion or the use of a set of slides, it is good policy to spend some time, as soon afterwards as is possible, in summarizing and in testing.

The functions of this step are obvious. Misconceptions may be cleared up; emphasis may be laid upon appropriate points; and the relation of things seen to problems and questions raised may be brought out. It serves as a learning exercise, in which the points of significance may be fixed. Due to the realization on the part of the student that he is to be held responsible for material presented visually, this follow-up serves as a stimulus to more painstaking and more intelligent observation.

Differences in technique for different types of material. The foregoing discussion has had in mind the use of somewhat large units of visual instruction, such as the showing of films or slides, and the making of field trips or excursions. Where small units of visual instruction are employed from day to day, such as the reference to a map, chart, or globe; the introduction of a picture, diagram, or outline on the blackboard; or the showing of an occasional specimen or relic, it is obvious that the more elaborate procedure involving advance preparation of the class and the follow-up is not necessary. The connections are so direct and obvious that little special effort to make them clear to the pupils is needed. But even the use of visual material in small units demands some advance thought.

Going over the work of coming lessons, teachers should be on the sharp lookout for opportunities where the use of visual material may be economical and may add to the effectiveness of the instruction. Notes should be made on

the lesson plan or on the margin of the textbook as reminders. The use of illustrative material or devices should be thought through in advance, to make certain that the use of the material will be a success.

Uses of visual material by pupils. One should not make the mistake of considering the use of visual materials as being limited to that made of them by teachers themselves. Pupils should be trained to strengthen their recitations and reports by means of diagrams, graphs, pictures, models, charts, demonstrations, specimens, and similar graphic and concrete materials. Their use by pupils not only makes recitations, discussions, and reports much more valuable to the members of the class, but serves also to cause the student to regard his report or recitation as a real audience-situation in which he is trying to convey his ideas, as effectively as possible, to the class audience.

The student should feel free to step to the board, and should be encouraged and trained to do so, to diagram or illustrate his ideas or recitations wherever such a procedure would add to the clarity or effectiveness of whatever he has to say. The reality of the situation created, and the relief from the monotony of verbalism, are alike stimulating to both reporter and audience. The responsibility for illustration necessitates a rather clear understanding of the material as a preliminary step to the choice and planning of the illustrative material.

The use of illustrative material by pupils in reporting projects is continually becoming more and more common. Quite often individual laboratory work in science, or demonstrations carried on by the instructor, might well be replaced by student demonstrations, using groups or individuals as the occasion seems to suggest.

Students may also be employed to advantage as assistants to the teacher in the showing of slides and films.

3. *Instruction by means of projective apparatus*

Selection of films. As is the case with any type of visual material, the use of films in the classroom must come to be looked upon very much as is the use of a reference book, a map, a chart, or any other teaching accessory. Just as there are teachers who employ projects and the socialized recitation without reference to the aims of their work, and feel that this going through the motions has qualified them to rank as progressive and up-to-date teachers, so there are teachers who seem to show films just to be able to say that they are using them, or in the blind hope that the very using of films will increase the effectiveness of the teaching.

The justification for using a film is that it vivifies, makes concrete, enlivens, and vitalizes the instruction being given — that it gives a clearer understanding, a more vivid and a more accurate imagery and apperceptive mass, or that it arouses desirable interest. Pictures shown merely because they are interesting, or because they have *some* educational value, are likely to be of minimum usefulness.

Technique in using films. With no type of visual instruction is the importance of the advance work greater than with film instruction. Clear thinking must be employed in deciding whether the use of the film is desirable. Ordinarily the film should not be substituted for demonstration work in teaching science, or in teaching how to make or to do something, if the experiment or process can be demonstrated instead. The greatest field for the use of the film probably always will be in representing motion and action, as in this it has unquestioned superiority. Because of the relative advantages of other means of visual presentation, the use of motion pictures, aside from displaying motion or action, probably should be restricted to material of instruction inaccessible through other visual avenues.

Careful planning ahead is more necessary with films than with any other type of visual material, because of the necessity for arranging bookings in advance. Owing to the difficulties attending the giving of instruction during the showing of the film, the advance preparation of the class is peculiarly important. The importance of this step is also accentuated by the increased likelihood of the pupil failing to note essentials, due to the complexity and richness of the picture, the large amount of non-essential material presented, and the rapid change of stimuli as compared with other types of visual aids. For much the same reasons the follow-up is quite important; more so, for example, than with slides, where some discussion and checking may be more easily done during the showing.

It is not considered advisable to show films relating to more than one topic at the same showing, or to show all of long films at one period. It is sometimes worth while to show a film twice, the second time after discussion. This is true where worth-while points have been missed, and where interest has been aroused in the discussion in the educative phases of the film. Ordinarily it is not advisable to show more than one reel at a sitting, but where more than one is shown, any long waits between reels should be provided for, and not be permitted to become an opportunity for disorder and distraction. Mechanical and hygienic conditions, of course, should be well taken care of, so that the students are comfortable and the presentation is attractive. No considerable time in class should be spent in obtaining a focus. The room should be sufficiently dark, and properly ventilated.

Slides and opaque projections. Slides have the advantages over films of being cheap and more available and adaptable for educational purposes. Because of their inexpensiveness they may be purchased outright. They may

also be borrowed from the State bureaus doing school extension work, and sometimes from commercial organizations. It takes very little training to be able to prepare slides. The outfit required for making slides is simple, and the materials needed are inexpensive. In addition to the advantage in the matter of expense, slide projections may be examined at length, and may be accompanied by discussion. This opportunity for discussion and fixation no doubt adds to the permanence of retention. Questions as to matters which stand in the way of complete understanding may be raised and answered. Many of these, if not answered at the time, might not be thought of again.

One of the most important developments in connection with the stereopticon has been the perfection of attachments for projecting opaques, by means of which postcards, pictures from text and reference books, cuts from magazines and journals, drawings or diagrams prepared by pupils or the teacher, railway folders, and advertising material of all sorts may be used. The economy of showing opaques to the class as a whole, with accompanying explanation and direction, as compared with passing them out directly to the class, is apparent.

Where a number of slides or opaques are shown in succession, adequate preparation of the class and a follow-up are desirable. However, owing to the opportunity for discussion during the showing, there is less necessity for special follow-up work. The summaries and tests ordinarily used to cover all the work are sufficient.

Increasing use of slides. While slides have been used most widely in the teaching of geography and the natural sciences, their usefulness is by no means confined to these subjects. They may frequently be used to advantage in literature, foreign languages, history, and the social sciences, and occasionally in mathematics and vocational subjects.

In a list of educational slides, loaned free by the extension division of a small western university, there are listed twelve sets of slides for the teaching of literature, forty for history, and almost as many which may be used in teaching foreign languages. Something over two hundred sets are available for science and geography, and approximately one hundred on miscellaneous topics. In addition there are rock collections and microscope slides, which are obtainable for the transportation charges. In a number of larger State universities of the Middle West, even much more than this amount of slide material is available for free distribution.

With the development of small portable stereopticons which do not require darkened rooms, and with attachments for opaque projection which, when used with a special screen, may be shown in rooms only slightly darkened, the possibilities of slides and opaque projections have multiplied within recent years. In many schools, to-day, teachers will be found employing a small portable machine, resting upon one of the front desks, from which pictures illustrating points arising from time to time in the day's lesson are thrown upon the white wall, on a small white cloth, on a screen on rollers, or even on the blackboard. It seems probable that, at least in certain subjects, such a piece of equipment will soon be thought of as standard teaching equipment, much as are blackboards and maps to-day. The possibilities for the profitable use of such a piece of apparatus have only begun to be seen.

Another very significant development in visual instruction which will serve in assisting to popularize the use of slides is the invention and manufacture of film slides. Film slides are sold at but a small fraction of the cost of glass slides and the cost of transportation is but a small per cent of that of the heavier glass slides.

4. *Visual instruction outside the classroom*

The field trip or excursion. "If you can't bring the mountain to Mahomet, take Mahomet to the mountain," is a way of saying that if you can't bring needed visual material to the classroom, then take the class to the material. The field trip is not a new nor a uniformly successful means of teaching. It has been quite widely used in the teaching of high school science, geography, and nature study. Because of the new aims and new content in the teaching of civics and history, the field trip has come to be used more frequently in recent years than formerly for these subjects. To some extent it is used also in arithmetic and geometry.

The field trip or excursion, though, has not come into more common use as a means of teaching because of certain very serious and practical disadvantages and limitations which accompany its use. Among these are the excessive amount of time required, and the difficulties attending the conducting of the excursions. Many such ventures culminate in the earnest resolution, "Never again." The school program, especially where departmental teaching is employed, is an almost insuperable barrier, though in many cases where there is a will there seems to be a way. The actual amount of time required for the exercise, though, bids us pause and weigh the definite need for and possible outcomes of such a trip as against the time required. There will be, without question, instances where the time will be well spent. This is particularly true for teachers of geography, natural science, civics, and other social science. Especially in cities where there are art galleries, museums, and government buildings and institutions are there splendid possibilities for its use.

Preparation for trips. In employing field trips, the instructor should always at the outset consult the owners or stewards of the property to be observed. Humiliating

conclusions or interruptions of the work may thus be prevented. In the case of visits to industrial and commercial establishments, or to civic institutions, not only is this step wise in order to insure being welcome, but often, if approached diplomatically, those in charge will offer services and plans not originally expected by the instructor. Such assistance enhances the interest and educational possibilities of the venture, besides developing a feeling of satisfaction on the part of the owners or stewards from participating in the instruction of the youngsters which will operate to insure a welcome upon future occasions.

It is also essential to make an advance circuit of the trip with a view to planning the educational possibilities. As in the case of moving pictures and slides, the advance preparation of the class can then be better done. Directions for observation can be formulated; questions and problems can be raised upon which the trip is likely to throw light; the points of interest and significance may be located; and the route of the trip can be planned and the detailed routine can be better formulated.

Suggestions on technique of excursions. The following suggestions are worthy of consideration in the handling of excursions:

1. Be sure that there is a real need for an excursion, and that the gains will be proportionate to the time required and the readjustments made necessary because of it.
2. Go over the proposed trip in advance, with an eye to educational possibilities and efficient routine.
3. Plan the trip, the route, the bringing of the pupils into contact with the educational features, and the remarks to be made.
4. Prepare the class properly by means of directions, questions, problems, and by stimulating an interest in the educational features. Mimeographed directions and schedules will prevent confusion and misunderstanding, and will tend to insure an appropriate apportionment of the time to be spent.

5. Consider the desirability of having a signal for assembling the group; and if there is need for such, acquaint the class with it.
6. Follow up with discussion in which members of the class are held responsible for educational results, using short tests if necessary.
7. Take small groups wherever possible, making two trips or using assistants, if necessary.
8. In certain instances pupils may be sent on such trips on their own responsibility, singly or in groups, and then be called upon to account for results. Sometimes it will be profitable to have different groups make different trips and report their observations to the assembled class at school.

Places to visit. Places to visit for educational values are legion; a few examples that readily occur are:

Science: Field trips proper, to the habitat of fauna or flora which it is desirable to observe, and in geography when studying the physiographic aspects; to heating plants; to the water and sewage-disposal systems; to zoölogical and botanical gardens and museums; to various types of industries where principles of physics, chemistry, bacteriology, or general science are applied; to the gas plant; to the electric and power plants; and to railroad shops. Other points of interest in the community will occur to the teacher.

History and social sciences: Scenes and characters of local history; local civic institutions; the city hall, and its various offices and their functions; the city council; the courts and trials; the federal offices, if there be any; historical material in museums; and, for civic classes, health, police, and fire departments, dispensaries and hospitals, election polls, and any other place where the functions of government or community enterprises may be seen in operation.

English subjects: The local newspaper, where the manufacture of news may be witnessed; the library, where students may have this important means of continuing

education called to their attention, and learn of its possibilities and the technique of making use of it; for oral English, anywhere speeches are being made, such as law-making bodies and commercial clubs; the theater, to experience the work of an exceptional artist in drama; and places of many sorts, where material for composition might be gathered.

Mathematics: For arithmetic, to any retail establishment where the commercial processes lying back of the mathematical manipulation may be illustrated and impressed; the courthouse and the city hall, for the study of assessments and the making up of tax rolls; local banks, where banking methods related to arithmetic may be learned at first hand, and where modern instruments of calculation are used; new buildings under construction, in which distances and angles may be computed, where the expense of excavations may be estimated; and to many new projects, where cost data might be easily and profitably calculated.

Foreign languages: The possibilities for excursions are somewhat limited in the teaching of foreign languages. Occasionally an opportunity to witness a production of some sort of play, a festival, or a celebration will furnish a means of gathering ideas of foreign peoples, their costumes and their languages. Trips to foreign quarters in larger cities, where the business houses and living quarters may be seen, are usually profitable.

Art and music: By its very nature music is an auditory rather than a visual subject, but attendance upon concerts and musical performances is useful. Trips may be made wherever creations of art may be seen, as to art galleries, special art exhibitions, public buildings where sculpture and pictures may be found, to art shops, and to other commercial establishments where art in its various forms is to be seen.

The vocational and manual subjects. The opportunities

here also are legion, and readily suggest themselves. Factories, shops, and stores, or wherever trade and manufacture is carried on, and where there may be seen processes, organization, or equipment pertinent to the subject concerned, are the natural places to visit. In courses aimed to prepare young people for an intelligent and practical choice of a vocation, such trips are very valuable.

It often seems that the direct and definite contribution of such trips to the work of the school subject is relatively small, as compared with all the things observed. The tendency to departmentalization and specialization among teachers in subject-matter should not be permitted to obscure the fact that much that is seen on these visits, which is of no direct value to the particular subject in whose name the trip has been made, may furnish excellent experience and imagery for other subjects. It may, moreover, furnish useful information which, though quite essential to a complete education, is yet not ordinarily included in any school subject, and, for that reason, is all the more worth learning incidentally.

A very worth-while educational service is rendered the student in a number of private schools in New England and New York in the way of what may be called "travel tours." These schools, because of their fortunate geographical location, are able to conduct relatively inexpensive trips to places of historical interest and general educational value in and near Boston, New York, Philadelphia, and Washington, D.C. In certain public schools in large cities, well-planned trips to all kinds of places with educational possibilities are undertaken, including museums, art galleries, manufacturing plants, and botanical and zoölogical gardens. The fact that the subject-matter of such educational activity does not fit directly with any one school subject does not argue in the least against the educational value of such ventures. In the

very large majority of instances, the net gain to the student is probably much greater per unit of time spent than is realized from formal verbal instruction.

5. Other visual classroom aids

The stereograph. A generation ago there were two objects almost always to be found in a conventional "parlor." When conversation threatened to become an effort, or the entertainment of the guest became a problem in any way, these two never-failing helps — the family album and the stereograph — were resorted to. After an introduction to the numerous and well-posed aunts, uncles, cousins, and grandparents, the guest was treated to journeys to Niagara Falls, Europe, and various foreign lands. Not a little interest was taken in these lifelike and attractive pictures, and no doubt much geographical education was afforded through that medium.

Due to changing styles in entertainment these means have disappeared from American homes, but one large company engaged in their production and sale has since turned its attention to the manufacture of stereographs for use in the schools. From the Keystone View Company, of Meadville, Pennsylvania, we can to-day obtain sets of stereograph pictures which are very usable in every elementary school subject, and in a number of those taught in the high school as well. A very successful attempt has also been made to classify and arrange these materials to fit the needs of organized courses of study.

The peculiar advantage of the stereograph is the fact that when the picture is viewed through the stereoscope it gives the sensation upon which we depend for sensing the third dimension. The stereograph is really two pictures which appear as one, but which are, however, slightly different. The two halves of the stereograph are two views of the same

thing taken with a bifocal camera, or with two cameras, the focal openings of which are on the same level and just about the distance apart of a pair of human eyes. The lenses of the stereoscope are so constructed that, when in proper focus, the visual images of two halves of the stereograph are seen, each by the corresponding eye, and thus the visual sensations produced are almost identical with those which would have been experienced in looking at the actual subject of the picture through one's eyes. The picture is also magnified a little by the lens, which adds to the clearness of it. This feature gives charm and educational value to the picture through the illusion of reality and the consequent vividness of impression.

As evidence of the efficacy of the stereograph we have the results of an interesting experiment conducted by Dr. J. J. Weber, at Lawrence, Kansas, with one hundred and fifty pupils from grades three to six. He attempted to determine the relative effectiveness of using the stereographs in a certain type of lesson, as compared with instruction not aided by stereographs but otherwise similar. The lessons were concerned with the manufacture of glass bottles and manila hemp rope. He reports an increased effectiveness of over 90 per cent in favor of the instruction including the use of the visual material. He assigned five reasons for the gain — advantages quite commonly assigned to visual instruction, namely, increased interest, economy of time, less effort, more vividness, and more enduring impressions.

Technique of the use of the stereograph. Several methods of using stereoscopes and stereographs have been developed. More costly and less widely recommended is the "group" method, in which each pupil is furnished with a stereoscope and a set of pictures. The pupils then view each picture, all at the same time, with discussion by teacher and class, much in the fashion of the use of slides. Another and less

costly method is where each pupil is given a stereoscope, and one stereograph of the set to be studied. At regular intervals and at command of the teacher, each pupil passes the stereoscope with the stereograph mounted in it to a neighbor, until all pupils have seen all the pictures.

The individual or study-period method is used more commonly, is less expensive, and is more generally recommended. Two or three stereoscopes are placed on a table in a corner of the classroom, or the library, where they may be consulted just as is any other type of reference. Each pupil may then take as much time to each stereograph as he desires, or as is necessary to get what he feels he should from each picture.

When the latter method is employed, the class should be prepared in advance, since the study cannot be closely directed, and the attention of the pupils should have been called to all the essentials. Likewise, the follow-up discussion must be done skillfully, as well as quickly, and as a means of insuring the careful observation of the pictures and finding out if the pupils have gotten what they should from the work. This can be done in the subsequent recitation discussion of the material illustrated by the stereograph. At this time opportunity should be provided for those students who have made good use of the visual material to feel satisfaction from their efforts.

Maps and globes. No superior teacher of geography or history is satisfied to conduct his classes without the assistance of maps. Herodotus said that geography is the eye of history. True understanding of history without imagery of the location and topography of a country is almost impossible. Perhaps more than by any other one single means, history has been shaped by geography. Teachers of history should have at hand not only maps of the countries being studied as they now exist, but a set of historical maps

constructed especially for courses in history, such as the Sanford maps for American history, and the McConnell or the Webster-Knowlton-Hazen maps for ancient, mediæval, and modern European history.

These should be included in the minimum equipment for the teaching of history, should be constantly in the classroom, and should be referred to almost daily. Students should be encouraged to consult them during their study hours. Maps should also be consulted, and occasionally constructed where needed, in the study of literature having a geographical setting. Literary atlases of both English and American literature are available, and the use of globes is so well established and the occasions for their use so well understood that nothing need be said here as to their use.

Charts, graphs, models, and diagrams. Because of the time and ingenuity required for the construction of these graphic means of teaching, altogether too little use is made of such effective classroom aids. When teaching assignments are lightened, perhaps more use will be made of them. However, ambitious and energetic teachers do contrive to find time to work these things out and prepare them for class use. Some teachers are foresighted enough to prepare them in such form that they may be used again, and after a few years they assemble quite an assortment of such teaching accessories. Charts serve to give organization to ideas, and to fix that organization in the mind. Where relative size or number is to be presented, the column or bar diagram is much more effective than numbers. In tracing growth and development, as in the case of the population of the United States by ten-year intervals since 1840, the frequency polygon gives a much better idea than do figures. That this is true has been well realized by newspapers and magazines, which now very frequently use the bar and column diagram and the frequency polygon. Much use is also made of object

representation, as the representation of the size of navies by the relative size of drawings of ships. The sector diagram, where the proportional parts of a whole are represented as sectors of varying size of a complete circular area, is also much used to-day to show "how the tax dollar is spent," or the racial composition of the population of a city or of a State. Teachers can obtain much help in the construction and use of graphic forms of representation from such books as Rugg's *Primer of Graphics and Statistics*, or Williams's *Graphic Methods in Education*.

Because of the close similarity of models to real objects, caution should be employed in the use of them that the pupil does not assume the object actually to be as represented by the model. Colvin cites a case of a student in his class in psychology who was misled by thinking that a papier-mâché model of the brain represented accurately in all details the actual brain, and assumed that the brain was hollow, as was the model. Where models are not of the actual size of the object being illustrated, pupils should have the discrepancy in size pointed out, and if possible at some time have the actual object which has not lent itself conveniently to classroom use, shown to them. In many instances a model is quite superior to the actual object, because of its having been prepared to bring out the essential points being taught.

Diagrams should frequently be employed to give organization and summary, to establish associations, and to furnish more permanent means than spoken words by way of aiding retention. All of these different forms of graphic representation have their value in that we can envisage at a glance a large number of facts that would otherwise baffle any mind to deal with when presented *seriatim*. There is no subject taught in the upper grades or the high school, the teaching of which may not be strengthened by the intelligent

use of these simple devices. Even in the teaching of foreign languages much use should be made of diagrammatic *schemata* for learning rules, declensions, and conjugations.

Demonstrations and dramatizations. Space is lacking for a detailed treatment of the technique of using these two methods in visual instruction. Though not always regarded in that light, they are quite similar — the demonstration in the teaching of science, physical education, and vocational subjects occupying much the same relation to those subjects as does dramatization to English and history.

Demonstrations may well replace much of the individual laboratory work in the lower high school years, and some of it in the upper years. By so using them a great waste of pupil-time in experimentation is saved. In schools where all pupils cannot work on the same problem because of the small amount of apparatus, demonstration by the teacher becomes a necessity. The demonstration by the teacher also affords the occasion for a careful direction of the attention of the pupils to the experiment, and to the significant phases and developments of it. Demonstration is superior, too, because it can be resorted to as a teaching means at the time any topic is studied. Student demonstrations should also at times be employed in teaching.

Attention should be called to the suggestion, made earlier in the chapter, as to the desirability of preparing students somewhat in advance, so that they may gain a maximum from the demonstration, and not neglecting the follow-up work. There is also the necessity for a careful advance preparation of the materials and apparatus needed, and, in case where there exists any doubt, a rehearsal to make sure that the demonstration will be a success. Care should be taken to see that all pupils are so seated that the demonstration may be adequately observed.

Dramatization of content for the purpose of illustration

and demonstration is a questionable teaching device, and should be resorted to but seldom. There is no question as to the increased vividness of dramatized presentation, but the amount of pupil-time consumed in learning parts and in rehearsals bids us pause, to say nothing of the interference with other class work which so frequently results. There is probably no question but that, for those pupils who dramatize literature or history, their chances of obtaining a more complete and vivid picture of the content are increased. The device, though, should be used sparingly, and should not be overrated as an educational tool because of its showy and entertaining features. To be sure, on the other hand, it possesses certain values as a laboratory of expression. For most situations, though, not much time should be spent in perfecting and polishing the presentation. An hour or more every day for several weeks seems too much time to devote to this type of work.

Use of specimens, relics, and collections. An adequate science equipment will include sets of specimens for botany, zoölogy, and biology. A number of supply houses now prepare a large variety of specimens and sets for school use, and these are quite reasonably priced and enjoy a wide sale. For species found locally there is no reason for buying them, as it is better to collect and mount and label them.

The relic is to the history class what the specimen is to the science class. Old newspapers and documents, weapons, garments, and pieces of furniture are quite interest-provoking, and in many instances result in a better grasp of the subject-matter. Students may find these in their homes and those of their neighbors, and often a useful collection may be gathered together for a period-display in the schoolroom. Useful as the display may be, it involves some risk. Teachers who have had experience with this type of undertaking urge that it is advisable to exercise a close vigil over the treasured

exhibits to make certain that they may be returned to their owners.

Collections of specimens and relics and other objects for classroom use will be of more interest, no doubt, when furnished by the teacher or pupil, but they can be relied upon for use with less assurance than when owned or rented by the school. As in the case of films and slides, they are often obtainable from institutions of higher learning by the mere paying of the transportation charges. Many progressive city school systems are to-day purchasing collections and building up a museum or library of these teaching materials. Commercial exhibits are also beginning to be available for educational purposes, either free or for a small charge.

In the use of any visual material of this kind, care should be taken that the educational possibilities are not overlooked or confused with the interest shown by the pupils in the specimens themselves.

Pictures. Our better textbooks have not overlooked the educational value of good pictures, yet teachers are inclined to minimize the significance of them when found in the textbooks. The attention of the pupils should be directed to them; and what they show should be discussed. However, the number of useful pictures found in textbooks is small compared with the number of possibilities that exist for their use. The supply of pictures that may be made available for school purposes is almost boundless.

Pictures may be used for individual study, as well as for group study. Collections of pictures should be gathered and arranged and filed by school courses, and should become the property and a part of the working equipment of the teacher of the school. Like stereographs, they may be placed on a table in a corner of the room, or in the library, to be consulted at the convenience of the pupil. Upon suitable

occasions they may be posted on bulletin boards or display racks in the room for inspection, as other educative material may be placed, and thus be brought to the attention of the pupils in the classes.

Use of the blackboard. The American schoolroom is distinctive in the amount of wall space given to blackboards. It is also distinctive for the use made of these boards by the pupils, but it is not distinctive in the amount of use made of blackboards by the teacher. Just why more teachers will not take the trouble to use so convenient and so effective a means for organizing, emphasizing, and visualizing the work they teach is a mystery to those who supervise classroom instruction. Many teachers apparently are not aware of the extent to which the conversation they carry on in the classroom is lacking in meaning and clear imagery for many of the pupils. They gauge the significance to the pupil of the verbal exchanges of teacher and pupil by the imagery experienced by themselves at the time, but fail to realize that because of their training and maturity their ability in imagery is quite superior to that of the pupils. Often just a little use of the blackboard, for a diagram or a drawing, would greatly clarify the thinking of the class.

The types of illustrative material which may be put upon a blackboard are many. Simple outlines are quite useful in a number of subjects, especially when dealing with the content subjects. They serve to give organization, to provide emphasis, and to furnish a more lasting copy than the spoken word, and thus to promote retention. In one of the best exhibitions of teaching the writer has ever witnessed, a teacher-training lesson in a Missouri high school, the instructor outlined the work of the day on the board, as it was developed in class, so that it served at any moment as a useful summary of the work being done. Various sorts of diagrams may be used to show relationship, such as the

chronological arrangement of dates and events in parallel columns and representing different countries, or different phases — political, military, economic, and intellectual — of history. Diagrams are also quite helpful in showing the structure of political institutions, and the hierarchal classifications in science.

The efficiency of the teacher who teaches, chalk in hand, is without question greater than that of one who either does not see or fails to realize his opportunities to illustrate with chalk. Among the experiments completed by McClusky, to which we have referred before, was one in which the content was "The Story of a Mountain Glacier," and in which the film was compared with a chalk talk as to effectiveness in presentation. In four of eight instances the chalk talk proved to be decidedly superior; in three of the remaining four slightly superior; and in the remaining case very slightly inferior.

The use of colored chalk in blackboard illustration is recommended by nearly all authors of books on teaching methods. Its value as a means for lending emphasis through contrast is quite generally recognized.

Exhibits. In some subjects special exhibits may be employed to advantage. Especially is this true where the material exhibited is the work of the pupils, as maps, charts, projects in drawing, household or manual arts. In English a "beautiful book" exhibit may be employed to contribute to a love of good books.

Among the types of exhibits found useful are what are known as commercial exhibits. A large number of manufacturing and sales concerns supply, at small cost or free of charge, exhibits of educational value, usually depicting the manufacture or construction of their products or wares. "The History of a Saw," "The Making of a Lead-Pencil," and an exhibit of the products made from corn are examples.

Addresses where these exhibits may be obtained are given in certain of the references given at the close of the chapter.

QUESTIONS AND EXERCISES

1. Select, from the list of kinds of visual material given at the beginning of the chapter, several which are most usable in your special subject.
2. Be able to state the criteria to be kept in mind in selecting visual material.
3. Make a list of the types of occasions when visual instruction would be very appropriate.
4. Account for the fact that demonstration is superior to film instruction in teaching some types of things.
5. In reading the chapter, select suggestions on technique which do not seem to you as good, and state your reasons for questioning them.
6. Consult the files of a journal devoted to visual instruction and:
 - a. Get the names and addresses of five companies selling or renting visual material which you would like to use for your subject.
 - b. Read one article on the technique of visual instruction in some high school subject, preferably your own, and be ready to report on it in class.
7. How would the technique for using films vary from that for using slides? That of films from that of the stereoscope? That of films from that of the blackboard?
8. What suggestions for the technique of field trips would you emphasize?

SELECTED REFERENCES

I. General References.

Adam, John. *Exposition and Illustration in Teaching*. New York: The Macmillan Co., 1910. Pp. 389.

Especially Chapters XII through XVI.

Ankeny, J. V. "Some Arbitrary Standards for the Judging of Educational Films"; in *Visual Education*, vol. 5, pp. 446-47. (December, 1924.)

Baker, L. "Use of Visual Methods in High School Instruction"; in *Visual Education*, vol. 5, pp. 37-39, 83-85. (February and March, 1924.)

Carlson, Carl H. "How to Use Films in School"; in *Educational Film Magazine*, vol. 1, pp. 8-9, 31. (May, 1919.)

Constructive suggestions on the use of the motion picture in assembly hall and classroom.

Colvin, S. S. *An Introduction to High School Teaching*. New York: The Macmillan Co., 1919.

Chapter VII, "Adding New Knowledge through Illustration and Demonstration." Practical suggestions as to methods.

Crandal, E. T. "Visual Aims and How to Handle Them"; in *Proceedings of the National Education Association*, 1923, pp. 540-43.

Lists the types of visual material, with brief discussion, usable for instruction.

Davis, S. E. *The Work of the Teacher*. New York: The Macmillan Co., 1919.

Pp. 193-204, very practical, though brief, discussion of use of illustrative material.

Freeman, Frank N., and others. *Visual Education*. University of Chicago Press, 1924. Pp. 391.

Experimental data on the relative values of types of visual aids for different types of material.

Freeman, Frank N. "The Requirements of Education with Reference to Motion Pictures"; in *School Review*, vol. 31, pp. 340-50. (May, 1923.)

A discussion of the relation of films to educational demands; gives criterion for judging educational value of films.

Hays, Dudley Grant. "Visual Methods in the Chicago Schools"; in *Visual Education*, vol. 2, pp. 6-12, 52-55 (December, 1921); vol. 3, pp. 11-16, 75-77, 115-16, 193-98. (January, February, March, 1922.)

The first article considers fundamental principles; the second explains the making of slides by boys and girls in school; the third discusses use and operation of the classroom stereopticon; the fourth takes up the correlation between lantern slides and motion pictures in teaching.

Hoopingartner, Newman L. "How to Make Lantern Slides"; in *Moving Picture Age*, vol. 5, pp. 14-15, 22. (October, 1922.)

Keystone View Company, Meadville, Pennsylvania. *Visual Education*. Teachers' Guide to Keystone "600 set." Meadville, Pennsylvania, Keystone View Co., Educational Department. Pp. 715.

Public School Course of Study Monograph. Berkeley, California: Public School Bulletin No. 7, *Visual Instruction*. 1923.

Excellent brief discussion of values, uses, and sources of visual material.

McCracken, Thomas C., and Lamb, Helen E. *Occupational Information in the Elementary School*. Boston: Houghton Mifflin Co., 1923. Pp. 250.

Chapter XV on "Use of Films and Slides," and Appendices giving lists of books, pamphlets, slides, and films for use.

Reynolds, Frederick William, and Anderson, Carl. *Motion Pictures*

and Motion Picture Equipment. United States Bureau of Education. Bulletin 82, 1919.

Excellent illustrations and technique of constructing devices for illustrating facts, ideas, and comparisons.

Tarr, Ralph S. *A Descriptive Catalogue of Twelve Hundred Lantern Slide Illustrations of Geography.* Ithaca, New York: The Geography Supply Bureau. Pp. 72.

Rugg, H. O. *A Primer of Graphics and Statistics for Teachers.* Boston: Houghton Mifflin Co., 1925. Pp. 142.

Williams, J. Harold. *Graphic Methods in Education.* Boston: Houghton Mifflin Co., 1924. Pp. 319.

2. Special Subjects.

Branom, M. E. *Teaching of Geography.* Ginn & Co., 1921.

Chapter VII, Observational Geography. Good discussion of field trips and excursions. Chapter VIII, Representative Geography. Classroom aids to visual images. Bibliography.

Crawford, G. Winifred. "The Teachers' and Pupils' Use of Visual Aids in Studying Geography"; *Visual Education*, vol. 2, pp. 6-11. (June, 1921.)

Dakin, F. A. "Ways in which Latin may be Brought into Vital Relation with School Life of To-day"; in *Classical Weekly*, vol. 7, pp. 193-99. (1914.)

Daniel, H. "American History in Moving Pictures"; in *World's Work*, vol. 44, pp. 540-47. (September, 1922.)

Davis, Ina C. "The Use of Moving Pictures in Teaching General Science"; in *General Science Quarterly*, vol. 7, pp. 102-12. (January, 1923.) Also in *School Science and Mathematics*, vol. 23, pp. 425-33. (May, 1923.)

Handschin, Chas. H. *Methods of Teaching Modern Languages.* World Book Co., 1923.
Chapter X, "Realia."

Henry, M. E. "Illustrative Material for Latin Teachers"; in *Classical Journal*, vol. 8, pp. 115-17. (1913.)

Hilson, Jane A., and Wheeling, Katherine G. "Illustrative Material for High School Literature"; in *English Journal*, vol. 11, pp. 482-90; 569-76; 632-41 (October, November, December, 1922); vol. 12, pp. 121-26; 189-96; 266-73; 334-41. (February, March, April, May, 1923.)

Comprehensive list of visual material and where to obtain it.

Howard, Claud. "The Use of Pictures in Teaching Literature"; in *English Journal*, vol. 5, pp. 539-43. (October, 1916.)

Johnson, Henry. *Teaching of History*. New York: The Macmillan Co., 1915.

Chapters VIII, IX, and X, visual material in the teaching of history.

Knowlton, Daniel C. "Current Events through Pictures"; in *Historical Outlook*, vol. 10, pp. 24-28. (January, 1919.)

Lemon, H. B. "Use of Motion Pictures in Physics Teaching"; in *School Science and Mathematics*, vol. 22, pp. 254-55. (March, 1922.)

Macleod, Annie Louise. "Motion Pictures in the Teaching of Chemistry"; in *Educational Film Magazine*, vol. 4, pp. 7-9. (September, 1920.)

Sage, Eugene. "Illustrating the Classics"; in *English Journal*, vol. 11, pp. 110-16. (February, 1922.)

Description of a very useful class project in illustrative material.

Smith, Dora V. "More Illustrative Material for High School Literature"; in *English Journal*, vol. 31, pp. 191-200. (March, 1924.)

A list of usable material with addresses of firms from which it may be obtained.

Smith, E. E. *Teaching Geography by Problems*. Garden City, New York: Doubleday, Page & Co., 1922.

Pp. 279-84, good list of sources of visual material for use in teaching geography.

Strouble, J. H. "The Use of the Picture as Illustrative Material in Modern Languages Teaching"; in *Education*, vol. 43, pp. 363-72. (February, 1923.)

Taylor, R. Tunstall. "The Teaching of History by Motion Pictures"; in *English Leaflet*. (New England Association of Teachers of English), vol. 15, no. 128. (June, 1915.) 30 pp.

Twiss, G. R. *Principles of Science Teaching*. New York: The Macmillan Co., 1917.

Pp. 143-49, biology, and pp. 250-53, geography.

Wakefield, Ethel. "Teaching Literature with Films and Slides"; in *Visual Education*, vol. 4, pp. 4-6, 26. (January, 1923.)

Ward, C. C. "Pictures for the Use of Teachers of English"; in *English Journal*, vol. 4, pp. 671-74 (December, 1915); vol. 5, pp. 274-80. (April, 1916.)

Ward, C. C. "Pictures for Use in Teaching Literature"; in *English Journal*, vol. 6, pp. 267-69, 348-50. (April, May, 1917.)

Wayland, J. W. *How to Teach American History*. New York: The Macmillan Co., 1914.

Chapter XIV, "The Visual Appeal in Teaching History."

Woodruff, L. B. "Use of Maps, Pictures, Post Cards, Games, etc., in Studying Ancient Classical Life"; in *Classical Journal*, vol. 11, pp. 174-80. (December, 1915.)

Wuesthoff, W. W. "Blackboard Work in History Teaching"; in *History Teachers' Magazine*, vol. 8, pp. 253-60. (January, 1917.)

CHAPTER VIII

SOCIALIZED CLASS PROCEDURE

1. *Defects of the traditional recitation procedure:* A not uncommon type of recitation — The lack of coöperative effort — Such teaching procedures do not generate pupil responsibility — Perfunctory school work a natural result — Wrong pupil-teacher attitudes — Inadequate opportunity for training in initiative, originality, expression, and judgment — Low level of interest and attention.
2. *Types of socialized procedure:* The movement for socialization — Forms of socialized class procedure — The formal plan — The informal group — Analogy to the discussion method.
3. *Aims and values of socialized procedure:* Aims of socialized procedure — Subject-matter *vs.* social and personal development — Experimental investigations — Experiment results.
Questions and exercises — Selected references.

1. Defects of the traditional recitation procedure

A not uncommon type of recitation. Picture a classroom occupied by twenty-five boys and girls, and a teacher of United States history. The teacher sits or stands at the front of the room. A book is open on his desk near by, or perhaps he holds it in his hands. Maybe it is a lesson plan that he holds instead of a book. In the corner at his right is a map on a tripod. The pupils are scattered about the room, seated at desks. Some have slid under the desk somewhat, their backs adding hypotenuses to the right angles formed by the seat and the back. With a few sly exceptions their books are closed. They toy with pencils or with the book covers. A few are writing. One is looking over a vocabulary in a French book which is open on his desk. Some are gazing out of the window. Others are tracing initials and figures on the desks.

The teacher is asking questions. He asks for a volunteer

answer. A few hands go up. "All right, William." William makes a brief answer, partly right. The teacher asks another question, assigning this one to John. John becomes engaged in the business of searching his memory, accompanying the process with the usual physical modes of expression. He looks intently at the book, his brow in a frown. After a pause, the question is passed on to Mary. Mary makes a rather fortunate guess, though a brief one. The teacher elaborates the reply. Harold expresses an interpretation slightly to the contrary. The teacher mildly and pleasantly explains his error. Another question is asked. Lillian does the best she can, concluding with: "Is that what you want?" Unfortunately it isn't, so Hazel is given a chance. Hazel collects herself from a little mental wandering long enough to say, "I don't know that." The teacher is quite certain that some one must know it. Susan and Charlie strike out in the pinch, and at last the teacher in desperation exclaims: "Well, Margaret." Margaret always knows, but Margaret by this time has forgotten just how the question was worded. The exasperated teacher, now quite self-conscious, turns to Henry, who readily concedes his lack of preparation. "Can't any one tell me?" the teacher pleads. No one can, so the question is to be looked up for to-morrow. Certainly after going thus far, it must not be told to the class. No one makes note of it. William's book slips over the edge of the desk onto the floor. Lillian starts with a little "Oh," and then becomes amused at herself. Others are amused; one giggles. James looks at his watch, while Tom writes on the edge of his notebook — "My gosh, was it ever thus?"

The essence of the above scene is not an uncommon occurrence. Instead, it is more nearly a typical daily occurrence in many classrooms. While the ability of the members of the class to answer the questions put to them may vary,

from time to time or from class to class, the procedure of questions and answers described is quite typical of much of the teaching in our high schools and upper elementary school grades to-day. While occasionally questions are asked by the pupils, short lectures are given by the teacher, and, on rare occasions, visual material or projects being worked by class members occupy the class for a few minutes, for the most part the class period is taken up with quizzing and testing over the assigned lesson of the day.

The lack of coöperative effort. There is a peculiar inconsistency in such teaching situations. In the recitation there are groups of pupils — the human material of social situations — but, because of the individualistic and authoritative methods used by the teacher in instruction, actual social situations are not created except in a very limited way. There is no group aim; there is no opportunity for coöperation. The responsibility of each pupil is not to the group, but to the teacher. The relation is that of pupil-teacher, rather than that of pupil-group. Recitations are not made as contributions to the group, but to the teacher, and ordinarily no pretense is made by the pupil of addressing the group when reciting. While here and there group discussions or projects are carried on, the catechetical type of recitation is employed more regularly than is any other form.

It is a rare class, under the recitation system, which is characterized by a coöperative attitude. In fact, the type of teaching we have just described tends to prevent the creation of just this. The incentives of the school, too, are based largely upon an appeal to rivalry and other individualistic tendencies. Medals, privileges, and grades are not calculated to result in coöperative effort. Too often school work, under such conditions, is a case of "every fellow for himself, and the devil take the hindmost." The nature of

the class assignments, too, is such that each student works by himself, and for his own individual progress. Each one's work is to be one's own.

This situation is not the most desirable. Since our forms of government, the structure and fabric of practically all our economic effort, the nature of the primary unit of society — the home, and to a very large extent our forms of leisure enjoyment are dependent upon attitudes of good will, a spirit of give and take, and coöperative effort and alternate leadership, the need for the school training of pupils for proficiency in these directions should be kept in the foreground. High school courses of study and methods of teaching should be formulated with these objectives as a criterion. The old individual methods of teaching contribute little to this end. In fact, they tend to develop qualities of character which are of but doubtful value in the civic, economic, and domestic activities of life. Class exercises in which the attention of pupils is retained largely by the expectation of an opportunity to point out error in the recitation of a fellow student, or for one's own individual interest, can hardly be said to constitute training in co-operation or good will.

Such teaching procedures do not generate pupil responsibility. One of the outstanding characteristics of school work in the upper grades, the high schools, and the undergraduate collegiate work of the United States is the attitude which the learner quite generally exhibits toward the success of the learning enterprise. Observing pupils at work in a school, one might be led to believe that only the teacher profits by the teaching, and that the pupils participate only because it is their misfortune to have to be in school. The general attitude of the pupils too often is that of the day laborer who has no share or interest in the successful completion of the work at hand, save to satisfy the immediate supervisor

or inspector. The learning seems to be the teacher's responsibility; it is what he is paid for.

The attitude and procedure of the teacher likewise too often favor such an impression. The ambitious soul assumes the full responsibility for the pupil's learning. He prepares all the materials, and formulates all the procedures. The students have but to obey; it is not in any sense their project. The teacher not only assists the youngsters to learn; he endeavors to make them learn. He artificially rewards their successes, and penalizes their failures. The pupil is bribed to learn, and dared not to, and as a result he quite readily continues to sit steadfast in his position of immunity from responsibility for his own education.

There is very noticeably lacking, as a result of such teaching procedures, that enthusiasm and keenness and seriousness of purpose which characterized the youngster when engaged in the promotion of some activity for which he feels responsible, or for which a group of which he is a member on more or less equal footing with others is responsible.

Perfunctory school work a natural result. It follows quite naturally, from the assumption of teacher responsibility and the corresponding lack of student responsibility in learning, that the resulting pupil activity is largely perfunctory. The goal is to satisfy the arbitrary demands imposed by the teacher. The success of any activity is judged by such a goal, rather than by the progress made in the subjects studied. It is then too much to expect that young people will naturally gauge their work in terms of such progress; this they will have to acquire along with increased maturity. The old type of recitation does not foster such development.

There is lacking in the individualized recitation, too, a motive of social approval. This most powerful of human drives has not as yet been successfully harnessed in much of

our high school teaching. Under prevailing conditions, reciting to teachers can hardly be expected to win the approval of fellow pupils, and failure to recite to teachers does not provoke any disapproval from the members of the class. The rehashing of material with which all are more or less familiar operates but little, if at all, to excite much response in one's fellows. Classes assemble. Students take their seats and come to order, and await being called upon. No one has a message to give, no one an enterprise to further. Some are desirous of making good marks, others are indifferent, and still others hesitate to strive for them in the recitation period because of the attitude their comrades may take toward them if they do. An interested attitude is not "good form." Adolescents do not care to be regarded as bookworms, as grinds, or as childishly enthusiastic. Efforts to further the work of the class hour gain no favor with the group. The responsibility is not theirs. Pupils are called upon; they recite perfunctorily; they listen perfunctorily, or not at all. Occasionally a pupil offers a somewhat original contribution. Many times it is received somewhat coolly by the teacher. It is not in the lesson, and the quizzing is resumed. Points upon which the pupils seem vague are explained, but the pupils have felt little need for explanations and listen inattentively. They would have been just as happy had the explanation not been given. The end of the hour is finally reached. An additional increment of the book is assigned, and the students are exhorted to study it carefully. They pull themselves together and, as the class is dismissed, break out into animated and interested conversation about things which have significance for them, and about activities in which they have an actual part.

Wrong pupil-teacher attitudes. In schools where the teachers generally assume the responsibility for the learning,

and the planning and stimulation of the teaching procedure, the student not infrequently comes to identify the teacher with the labor involved in the preparation of the daily lesson. He is the taskmaster. It is for him that all this trouble is undergone. It is he who chides and gives low marks. The common interest serving to bind a class together tends to become a feeling of common sympathy toward each other, arising from the imagined aggression of the teacher upon the class as a whole. The slightest misunderstanding of motives, or the slightest indication of unfairness, will sometimes operate to set ablaze this smouldering feeling of resentment.

The teacher, who in reality is bending every effort for the benefit and the improvement of his pupils, finds himself regarded not as a friend and helper, a guide and teacher, but as an aggressor, oppressor, tyrant, taskmaster, and inspector. The student's conception or criterion of progress comes to be the extent to which he can satisfy the teacher. Little else counts, and when this has been done effort ceases. The goal of mastery of subject-matter or personal development is lost sight of, and the individual seeks immunity, ostrich-like, under cover of the size of the class.

Inadequate opportunity for training in initiative, originality, expression, and judgment. A criticism frequently leveled at the recitation is that there is a general lack of opportunity for or encouragement of spontaneous expression, and that because of the lack of such an outlet, the youngsters are not trained to think. It can hardly be denied that the recitation as commonly conducted is more a matter of reciting what has been learned than it is a place for reflective thinking. It seems quite reasonable to believe that such procedure, whatever may be its efficacy in storing the minds of young people with facts, is not the most likely method to use if we desire to develop initiative and resourcefulness in thinking.

It seems fair to say, also, that no premium is placed by such recitation procedures upon open-mindedness and a questioning attitude. Things are not questioned; they are learned. This may for the time be the most rapid way of learning, but it is not the method that will result in complete understanding, assimilation, and mastery, or even in permanent retention. Things developed in class and discussed and reasoned about, rather than things roughly memorized for the sake of passing muster in the recitation, are the ones certain to become thoroughly and completely the possession of the pupil.

The work of the pupil becomes, to too great an extent, a matter of acquiring information. To attain the aims of education, it is necessary too that we develop the methods, the ability, and the habit of thinking clearly and for one's self, as well as strength of personality, initiative, and originality. The temporary acquisition of information will not suffice to do these things.

Low level of interest and attention. That there is no gripping interest in the type of recitation we have described, that the level of attention is low, and that no permanent interests are generated, may be said to be due to an outgrowth of the features so far discussed — the wrong emphasis of teacher responsibility, authority methods, the lack of opportunity for expression and originality, the monopoly of the class time by the few, the formal procedure as opposed to the psychological order, the lack of the feeling of group enterprises, and the lack of opportunity for class discussion.

2. Types of socialized procedure

The movement for socialization. Because of a realization that these weaknesses of the prevailing teaching exist, teachers of initiative and ability have striven to find more

effective teaching methods. A prominent development of their experimental efforts has been in the direction of socializing the class activity, with a resulting tendency to reduce formalism and perfunctoriness, to make for naturalness, and to shift the impelling drive from without the pupil to within him.

The movement for socialization has taken several forms, and it has made its contribution in several directions. One has been evident in the recent tendency toward the introduction of a more socialized subject-matter. By this is meant a subject-matter more intimately connected with the affairs of human life — economic, civic, social, hygienic, vocational, and personal — and a subject-matter chosen largely on the basis of its value as training for life situations. More will be said of this development in another connection.

Another expression of the movement may be observed in the present encouragement and development of more socialized school activities; that is, activities of school groups carried on with the spontaneity and naturalness of out-of-school social activities. These "extra-curricular activities" include athletic games of all kinds, debating, journalistic work, scientific and commercial enterprises of all sorts, student assemblies, room programs, and other similar projects. When properly organized and managed these have come to be regarded as opportunities for training and for progress toward the objectives of the school.

A third expression of the movement may be seen in the growing socialization of school control. This has manifested itself in the participation of pupils in the management of not only the so-called student activities, but to some degree in the control of general school morale and "discipline" as well.

There have also been two prominent developments of the socialization movement which have materially changed modern teaching methods. One has been concerned with

the method of conducting the class exercise; the other, which usually involves the first, though not necessarily so, has been related to the organization of the subject-matter of the course and direction of the efforts of the students through entirely different types of working assignments. The first has come to be called the "socialized recitation"; the latter, the "problem-project" method. We will concern ourselves in this and the following chapter with the socialized recitation, and reserve for a later treatment the discussion of problem and project methods. Both are protests against the artificiality, the repression, the perfunctoriness, the listlessness, and the deadliness of the ordinary type of school recitation, and the lack of provision made therein for stimulating the initiative, the originality, and the self-expression of the pupils.

Forms of socialized class procedure. While efforts to socialize teaching methods have taken a multitude of forms, there have developed two quite distinct types of socialized class procedure. It is a common occurrence to hear one or the other mentioned as "*the* socialized recitation." That socialized procedure has been given this term is doubly unfortunate. In the first place, if the procedure is truly socialized it ordinarily is not a recitation. Secondly, there is no one of the many plans or devices for socializing class procedure which can be designated as *the* socialized recitation.

The various plans for socializing class procedure fall roughly into two classes, or types.

A number of names have been applied to the two recognized types of socialized procedure. One has been at different times called the formal, the institutional, the parliamentary, and the self-directing type; the other the informal, the discussion, or the seminar type. Though they have some features in common, in other respects they are

quite distinct, and teachers have differed vigorously as to their relative merits.

The formal plan. The most striking type of socialized "recitation" is the plan of organizing a class for work after the scheme of some adult organization. Classes in history or civics become city councils, legislatures, or a house of congress; upon other occasions they may be organized as a court or as an election board. Classes in English become dramatic clubs, literary societies, or news staffs of newspapers. In many instances it is decided that no adult organization offers any advantages over an organization planned by the group to meet the needs and desires of the particular class and its work.

The general principles underlying the two plans are the same — under each the group, through its representatives, manages and carries on, with the advice and suggestion of the teacher, the work of the class. As a group under the leadership of representatives the class assumes a major share in the responsibilities for the work.

The informal group. Because the plan of the informal group is less spectacular and novel, and because it seems merely a development of ordinary recitation methods, this type of socialized procedure has with difficulty found recognition as a form of the "socialized recitation." Yet it possesses advantages and freedom from some of the limitations of the formal plan to such an extent that many teachers prefer it.

The informal procedure involves no special organization. In fact many times the recitation simply comes to be, from day to day, more and more socialized until at length the old quiz recitation and the individualistic pupil-teacher relation have quietly disappeared. More discussion is encouraged. The instructor recedes from the limelight. Students come to respond to one another directly without the medium of the

teacher. Coöperative work is encouraged. Mutual helpfulness and the fellowship of common goals become prominent. The goal becomes the mastery of the work at hand. Plans for its realization are laid and discussed. Divisions of labor are provided. Plans for locating and furnishing reference material are volunteered in class. Games and other types of social drill-work will be carried on as a group.

The extent to which this procedure should go to become a "socialized recitation" is not a practical question. No one can say just how far it must go to constitute, technically, a "socialized recitation." It is certain, however, that when there is a feeling of social good-will — a feeling of desire to promote the work of the group; a spirit of coöperativeness; opportunity as well as impulse for expression; a feeling of "we-ness" as well as the desire to do well individually; and when the unsocial attitudes common to the traditional recitations, the "sab-cat" attitude of doing only what is compelled, and the perfunctory attitude, have alike disappeared — then there is socialized teaching.

Analogy to the discussion method. The informal type of socialized class procedure is not radically different from the "discussion" or "conversational" method of teaching. Discussion and conversation actually are outstanding features of the informal plan. In the socialized class period there will be little of the oral-quiz type of reciting, though there will be reciting of a sort. In the discussion of the topic under consideration students will tell what they know or give their versions. Some will contribute information or viewpoints gathered from outside the class. The more socialized the class, the more help of this sort that will be volunteered. There will be disagreements as to facts; there will be supplementation of one by another; there will be disagreement as to interpretation and opinion. Students

will speak to the group, consciously rather than incidentally — that is, they will actually desire to address themselves to the group rather than to the teacher. However, the informal socialized class procedure is not to be thought of as merely synonymous with discussion methods. It is more than merely the form of the recitation. It includes the spirit of the class, and the attitude of the members of the class toward the teacher, toward each other, and toward the work itself.

The informal plan affords certain opportunities for the exercise of teaching skill which are not so easily realized in the more highly organized type. In the informal method the teacher remains an integral part of the group and its leader. While he no longer monopolizes the focus of attention, and the relation is no longer merely one between him and the successive individual pupils, he is not at all in the position of an onlooker. With much more ease and less appearance of asserting himself as teacher, it is possible for him to guide the discussion, steer it, stimulate it, and to play an active part at times when there is need for mature and trained leadership.

3. Aims and values of socialized procedure

Aims of socialized procedure. It might be said that the aims of the socialized procedure are suggested in the criticisms of the traditional recitation — that is, its aims are to remedy the defects previously described. One might also say that the claims made for it are that it will remedy those defects.

The socialized class procedure aims to:

1. Give the pupil a feeling of responsibility for his own progress.
2. Relieve the teacher of the unnatural position in which he is now usually placed, and to provide a favorable situation for the growth of good will between pupil and teacher.

3. Give the pupil goals in terms of the work being done, and not in terms of satisfying the teacher, securing grades, etc.
4. Develop in the pupil the attitude and habit of helpfulness — the desire to promote the objectives of the group.
5. Develop skill in coöperation — the ability to adjust to and work with others — and to repress and stunt individualistic tendencies which threaten good will.
6. Develop the habit and power of initiative and self-reliance.
7. Favor more effective methods of work, as the use of outside references, and the project method.
8. Develop skill in clear thinking, train in proper methods of thinking procedure, and awaken an attitude of open-mindedness and suspended judgment.
9. Develop skill in oral expression through interested discussion.
10. Develop ability to use freedom profitably; to manage one's self through the gradual introduction to responsibility, and the gradual removal of restraint and compulsion.
11. Acquire certain conventions and social attitudes quite important in themselves, such as consideration for others, politeness, willingness to give and take criticism, etc.
12. Create a more impelling interest in the work of the subject through the more natural participation of the pupil in discussions, and by giving the pupil some self-direction of his energies and activities.
13. Make the class period contribute more effectively to the mastery of the subject-matter through the use of a psychological approach, and a consequently higher level of attention.
14. Provide more appealing and satisfying activities by formulating procedure more in the light of the needs of pupil nature and the satisfaction of instinctive cravings, such as the desire to construct and manage, the desire for imitation and dramatization, the desire for novelty and variety, and the desire for the stimulus of group endeavor.
15. Provide opportunity for intimate contact of the teacher with the activities of young people, carried on in a natural manner, and by means of which the teacher may understand better the workings of the pupil's mind.
16. Provide natural stimuli to excel, to desire to lead, and to contribute most to the class procedure.

Space will not be consumed here in a discussion of these

aims and how they are to be accomplished. The possibilities of the socialized method for attaining a number of these aims are somewhat evident from the considerations already given in this chapter.

Subject-matter *vs.* social and personal development. A perusal of the foregoing aims shows that a number of them are not stated in terms of subject-matter. They seem to have nothing to do with the mastery of algebra, history, geography, or biology, but seem rather to center on the development of more general and personal traits. We cannot here go into a discussion of the relative importance of historical facts and methods of thinking, of algebraic manipulation and conversational skill, of geographical facts and the attitudes and habit of coöperativeness, or of passive memorizing and initiative and originality, but it is clear that the philosophy of the socialized "recitation" places a premium upon the development of these social and intellectual skills, habits, and attitudes.

On the other hand, it is not to be admitted that the subject-matter is to suffer. It is claimed vigorously that not only may training in these social and intellectual skills, habits, and attitudes be better fostered by socialized methods, but that the subject-matter used to develop them will be as well or better mastered than under the traditional methods. There will be increased interest, increased individual responsibility, and a more wholesome attitude toward the work of the class. Those who use the formal plan claim that the class assumes a contractual responsibility for the work, and their pride in discharging it leads them to especial care that the work be well done. The students now feel that "this is our job, and we must do it well." The audience situation, it is claimed, which resembles a conversation carried on by a group of people, naturally tends to raise the level of attention and the conditions of learning.

It has been noted by some that the new attitude of personal responsibility for progress, as opposed to "being taught," tends to build up within the pupil a permanent interest in the subject. Under other types of teaching procedure this may easily be overshadowed by the feeling of being compelled to study by teacher, grades, desire for promotion, fear of ridicule, or other similar forces.

Experimental investigations. The best test of the values of the socialized procedures would seem to lie in the determination of their effectiveness through experimental investigations. This is likely to prove to be a difficult if not an impossible task. It will not be so difficult to test the relative efficacy of socialized and traditional methods, as judged by the results of standard tests or examinations, but it will be difficult to measure other very significant types of results. It will be possible to conduct experiments in which pairs of classes, made up of pupils selected so as to be approximately equal in general intelligence and special ability in the subject taught, may be taught by teachers of approximately equal ability, or by the same teacher, and in doing this to hold other influential factors approximately equal. The great difficulty will lie in devising means for measuring the progress of the experimental classes in such matters as initiative, coöperativeness, permanent interests, originality, oral expression, and similar qualities of large importance in pupil growth. Since some of these qualities probably are being simultaneously developed in other classes and in out-of-school activities, it will be next to impossible to say to what extent any increase in these qualities may be due to the work of the experimental class. Again, since their field of application is so large and their importance for success in life is so great, and the means of measuring them are so crude, the error of measurement would be relatively great enough in many instances to distort, out of all reality, the

amounts of development in these lines which came by following socialized procedures.

We have as yet but few scientific experiments to test the value of the socialized recitation. The testimony of teachers having employed socialized methods naturally varies. A few are pessimistic as to the possibilities of its use; others are highly enthusiastic over it as a form of class procedure. Many in each group have not given the method sufficiently intelligent or long-enough-continued trial to warrant any real conclusions. Almost uniformly they speak of the values of the method too much in terms of its increased effectiveness as an instrument for teaching their subject-matter, and tend to neglect its usefulness in developing other valuable outcomes. In general, though, those who have given the method a trial are favorable to it.

Experimental results. In the way of experimental evidence, we would cite the results of three studies, mentioned in the list of selected references at the close of the chapter. The study by Taylor, made with the teaching of geography, history, and physiology to pupils in fifth- and sixth-grade classes, indicated a clear-cut superiority in each subject for the socialized type of procedure.

Thompson made a quantitative study to determine the relative efficacy of socialized and of academic methods in teaching written composition to high school students. From his results he concluded that the socialized procedure is clearly more effective, and also that the use of social stimuli — the motive of wanting to tell their fellows and the desire to please, benefit, interest, and convince — lends effectiveness to the teaching. Situations should be made as real as possible, he tells us, so as to appear less as artificial class exercises. He also found it effective to create situations in which the learner sees, in their natural setting, the use and value of the things learned.

Johnson studied two pairs of high school classes in algebra, using one as an experimental and the other as a control group. The pupils of each pair were given the Otis Self-Administering Tests of Mental Ability, and in each pair the control group and the experimental group were of approximately equal average intelligence and with approximately equal range of intelligence scores. An informal socialized study plan was used with the experimental group, preceded by short supervised study periods. The control class followed the traditional recitation plan. Johnson reports four advantages of the socialized plan over the conventional question-and-answer method:

1. More enthusiasm and better moral tone toward work, as indicated by less cheating.
2. Better opportunity to study individual pupils and their mental processes.
3. Better opportunity to aid individual pupils on special difficulties.
4. Better grasp of subject-matter.

While these experiments are open to certain technical criticisms, as are most experiments, they nevertheless are sufficiently significant as to results. In the minds of the men conducting them, they left no doubt as to the superiority of the socialized procedure. To these experimental findings we might add the favorable opinions of hundreds of elementary and high school teachers who have employed some form of socialized procedure, and who have been convinced as to its superior effectiveness as a method of teaching.

Having now considered the reasons advanced for the use of some better teaching procedure than the old-type class recitation form, and having described the types of socialized procedures that may be used and the aims and values to be found in their use, we shall, in the next chapter, describe the

technique of socialized procedure which the teacher will need to master to become proficient in its use, and also point out some of the dangers and limitations in the employment of this type of teaching method.

QUESTIONS AND EXERCISES

1. What are the important causes for the perfunctoriness in recitation work pictured at the beginning of the chapter?
2. Evaluate each of the criticisms of the prevailing type of class activity.
3. What was the most natural and most interested class of which you were ever a member, or the teacher? To what extent was it a socialized class?
4. Which do you believe the more effective method for use in teaching your subject — the formal or informal socialized procedure?
5. To what extent do you believe socialized procedure may be used in your subject?
6. To what extent do you believe socialized procedure will attain the advantages claimed for it? Give reasons.
7. Be able to distinguish clearly between the two types of plans for socialized procedure.
8. Make a list of five valuable abilities or attitudes which the use of socialized methods should contribute toward developing.
9. Why is it unscientific to compare the results obtained by the trial of some new method, such as the socialized recitation, with those obtained in similar classes with older methods?

SELECTED REFERENCES

- Buss, F. E. "The Socialized Recitation in Mathematics"; in *School Science and Mathematics*, vol. 19, pp. 844-48. (December, 1919.)
- Field, Byron F. "How to Add Vitality to Civics Instruction"; in *Historical Outlook*, vol. 15, pp. 75-80. (February, 1924.)
Worked out a civics senate and school city to illustrate facts and knowledge in civics class.
- Freeland, Geo. E. *Modern Elementary Practice*. New York: The Macmillan Co., 1919.
Chapter XVI, "The Socialization of Instruction." Socialization of schoolroom and class. See also pp. 328-38.
- Johnson, W. H. "The Socialized Recitation in the High School"; in *School Review*, vol. 32, pp. 682-87. (November, 1924.)
A report of a quantitative experiment to furnish data on efficacy of the socialized recitation as a means of teaching mathematics.

King, Irving. *Education for Social Efficiency*. New York: D. Appleton & Co., 1913.

Chapters XIV and XV deal with the values of coöperative effort and group work properly managed.

King, Irving. *Social Aspects of Education*. New York: The Macmillan Co., 1912.

Chapter XIX, "The Social Atmosphere of the School and the Learning Process."

Lull, H. G., Kyte, George, and Wilson, H. B. *Modern Methods of Teaching*. Silver, Burdett & Co., 1924.

Chapter V, "Socializing the School Work."

Lull, H. G. "Socialized School Procedure"; in *American Journal of Sociology*, vol. 24, pp. 681-91. (October, 1919.)

Mackie, Ransom A. "The History Recitation Socialized"; in *Historical Outlook*, vol. 10, pp. 256-58. (May, 1919.)

MacArthur, C. G. "The Scientific Teaching of Science"; in *Science*, vol. 52, pp. 347-51. (October, 1921.)

Nolan, Ona I. "The Socialized Program Adapted to the Intermediate School"; in *Journal of Education*, vol. 92, pp. 371-78. (October, 1920.)

An account of the possibilities of the socialized recitation and applications to specific school subjects.

Pechstein, L. A., and McGregor, A. L. *Psychology of the Junior High School Pupil*. Boston: Houghton Mifflin Co., 1924.

Chapter XIV, "Socialized Procedure in the Classroom."

Pierce, Bessie L. "The Socialized Recitation"; in *The Historical Outlook*, vol. 11, pp. 182-93. (April, 1920.)

Pierce, Bessie L. *The Socialized Recitation*. University of Iowa, Bulletin 81, 1922. 16 pp.

Practical suggestions and very definite helps.

Ruediger, Wm. C. *Vitalized Teaching*. Boston: Houghton Mifflin Co., 1922. 119 pp.

Pp. 91-100. Gives good examples of how not to conduct socialized procedures.

Robbins, Charles L. *The Socialized Recitation*. Boston: Allyn & Bacon, 1920. 100 pp.

Probably one of the best discussions of socialized procedure.

Smith, W. R. *An Introduction to Educational Sociology*. Boston: Houghton Mifflin Co., 1917.

Chapter XIX, "The Socialization of Teaching Methods."

Stormzand, Martin J. *Progressive Methods of Teaching*. Boston: Houghton Mifflin Co., 1924.

Pp. 268-88, "The Socialized Recitation."

Taylor, W. W. "Some Points in Favor of the Socialized Recitation"; in *Elementary School Journal*, vol. 22, pp. 776-80. (December, 1922.)

An account of a statistical study of the relative efficacy of socialized procedure.

Thomas, Frank W. *Training for Effective Study*. Boston: Houghton Mifflin Co., 1923.

Pp. 101-14. Relation to interest; application to upper grade school subjects.

Thorndike, E. L. "Education for Initiative and Originality"; in *Teachers' College Record*, vol. 17, pp. 405-16. (December, 1916.)

Van Denberg, Joseph K. *The Junior High School Idea*. Henry Holt & Co., 1922. 418 pp.

Chapter XV, "The Socialized Recitation."

Winston, W. C. "The Socialized Recitation"; in *Elementary School Journal*, vol. 22, pp. 575-83. (April, 1922.)

A discussion of socialized procedure from the viewpoint of the value of training in self-activity; methods of procedure are discussed.

CHAPTER IX

TECHNIQUE OF SOCIALIZED PROCEDURE

1. *Essentials of socialized procedure*: Fundamental principles — Spirit of pupil responsibility — Spontaneity, naturalness, and provision for initiative — Social solidarity and the spirit of helpfulness.
2. *Operating the formal type of socialized procedure*: Selecting a plan of organization — Use as little machinery as possible — Keep nature of the work in view — The student representatives — The conferences — Rotation in office.
3. *Operating the informal type of socialized procedure*: The informal group — Technique of the informal plan.
4. *Dangers and limitations of socialized procedure*: Cautions as to procedure — The tendency toward monopolization — The tendency toward rambling and unwise discussion — Controversy in class — Repressive supervision — Inadequate selection and emphasis of subject-matter — Lack of thoroughness in subject-matter — Danger of discouraging the slow pupil — “Half-baked” socialization — Developing unsocial attitudes — Socialization and poor discipline.
5. *Examples of socialized procedures*: Review procedure — Socialized review devices — Other socialized lesson plans — A socialized history lesson — Debate as a socialized procedure — Other devices.
Questions and exercises — Selected references.

1. *Essentials of socialized procedure*

Fundamental principles. In planning for socialized class methods, it is not safe merely to imitate the organization and methods of other teachers. While this caution probably would hold for any new method in teaching, it is especially important for the socialized recitation. Quite often a teacher with progressive tendencies, upon reading a report of the organization and procedure of another teacher along some modern line, is persuaded to attempt the method in one or more of his own classes. The mistake that is quite commonly made is in taking over the structure and technique in detail. Very often the venture fails under such conditions,

and the experimenter is then convinced that the idea is not sound. Intelligent procedure does not rely upon mere imitation. One must recognize that the socialized recitation means something more than merely setting up the machinery and the outward appearance of socialization. One must not be content to take this step and then sit down at the back of the room and await results, as if improvement of teaching technique were that simple a matter.

It has been within the experience of the author to have been invited to witness "socialized" recitations of this sort. In each case there was a student organization, and the pupils were "doing it all themselves"; but educational objectives generally, and those of the socialized method in particular, were obviously not in the foreground of the teacher's consciousness. Consideration for others was undeveloped. Initiative was confined largely to petty corrections. Originality could be seen only in crude attempts at humor. The subject-matter handled was making no contribution to the purposes and objectives for which it should have been taught. After a few days of this procedure, no doubt the teacher's sense of values would assert itself and demand that such mockery be brought to an end.

It is necessary for us to get at the underlying principles which make for the success of the enterprise. Adjustments and adaptations to the conditions of the particular situation in which the innovation will be attempted must be made. Successful adaptation to different subject-matter, to different levels of maturity of children, to different classes with different interests, and to different turns of events which present new difficulties, all alike demand a thorough grasp of objectives and the fundamentals of procedure, that the technique may be varied and adapted effectively.

Spirit of responsibility. The success of the venture depends largely upon the degree to which the class may be

brought to feel their sense of ownership and participation in the management of the enterprise. The degree of success may be marked by the extent to which the responsibility for furthering the work is shifted from the teacher to the class. This is the most important feature of both socialized class management and the project method. The loss resulting from the substitution of a youthful student chairman for the experienced and mature teacher, in the direct management of the class period, can only be compensated for by the increased interest and the corresponding higher levels of purposefulness and attention which follow from the awakening of a feeling of ownership and responsibility on the part of the class. The chief source of increased effectiveness will be the feeling, on the part of the students, that "we are doing it; it is up to us, we must make it go."

In order that this feeling may develop, the instructor should be both patient and cautious. He must be willing to suffer and govern impatience in the early stages, as well as at intervals throughout the work. At times when organization is poor, and when it seems that time is being wasted, forbearance is the price that must be paid for success. The class which is too closely directed is much like the student body and officers under student government who find that the faculty is still in the saddle, and with a taut rein on a sharp bit. It is the nature of young people to lose interest in over-directed activity. They prefer to run their own shows. For this reason instructors have need for considerable self-restraint and much diplomacy, when trying to be of service to young people in their undertakings. They should be allowed freedom to make mistakes, and to profit by them. They must be weaned from disinterested dependence as rapidly as possible.

Spontaneity, naturalness, and provision for initiative. One of the objects of the socialized recitation is the develop-

ment of a fashion of spontaneity and naturalness. Wherever organization and its machinery operate to inhibit or to discourage a free expression of opinion, or questioning and criticism, it is defeating its purpose. Many teachers prefer the informal to the formal plan on this account. If socialized recitations become cut-and-dried and formal, and if pupils do not participate freely and with ease, the class has not been socialized. If it is necessary to bring pressure to bear on individuals to contribute, then the old pupil-teacher individualism has not been much improved upon. Pupil autocracy has merely been substituted for teacher dictation. There should be freedom from repression on the one hand and from compulsion on the other. The best evidence of a truly socialized class is the willingness or eagerness of the members of the class to contribute to the work at hand — to offer information, questions, and criticisms.

Whatever form of socialized procedure is employed, it should be such as will place a premium upon initiative. Young people, as well as older people, like to work out their own ideas. They do not like being bound entirely to "assignments." Special work upon ideas of their own should be encouraged. Teachers who look with suspicion upon original ideas and the volunteer contributions of students — their questions and their criticisms, which are not "in the lesson," and which consume precious time which might otherwise be spent in hearing the lesson — are not likely to succeed very well with this type of pupil stimulation.

Social solidarity and the spirit of helpfulness. If the class period is to be socialized and the class is to become a social group rather than merely a collection of individuals, certain necessary conditions must be brought about. There must be a group recognition of common problems, of a need for coöperation in mutual help, a feeling of good-will and help-

fulness, a recognition of joint responsibility, and a desire on the part of each member for the good opinion of the group.

In the traditional recitation the outstanding thing making for social cohesion in a school class has too often been the common feeling of being repressed, or compelled from without. What group solidarity there has been has often operated, not in the direction of promoting and facilitating learning, but in slowing it up — even at times reaching the stage of intellectual sabotage, where pupils consciously hinder the work of the teacher because of a lack of socialization and the possession of an unfavorable attitude toward the work of the school. On the other hand, the power and importance of social cohesion are quite noticeable in the various forms of student activities, where a keen “we” feeling is generated; where contests divide the young people into two camps, and each is solid for defense or aggression. In athletics and debates, where the management and direction and responsibility are group charges, one also sees this group solidarity, as one does again in such student-body activities as the publication of school annuals and newspapers, the preparation of plays, and other similar projects. When that type of interest can be awakened also for units and projects of history, science, English, and other school subjects, the biggest problem of teaching will have been solved.

2. Operating the formal type of socialized procedure

Selecting a plan of organization. The first step in the employment of a formal plan of socialized recitation is that of determining upon the nature of the organization. At the outset, when plans of organization are worked out, there are two important considerations which should be kept in mind. One is to use as little class machinery as is possible, and the other is always to adapt the plan of

organization to the type of class work under way. We shall consider each of these requirements in order:

Use as little machinery as possible. It is necessary that the teacher should look ahead to the nature and purposes of the subject-matter he is presenting, and the possible method of treating it adequately in class, and then that he judge the desirability of possible schemes of class organization in relation to the subject-matter. The values and disadvantages of organizing the class in the form of some civic or commercial body should be carefully weighed, and the utility of such organization in promoting the work of the class should be determined.

It is difficult to set up definite rules for such a selection; the good judgment of the teacher is an important element here. For example, one teacher used quite successfully the organization of a court to carry on the work of a geometry class. Another teacher turned the review work of a European history class into an oral examination, patterned after that given candidates for the degree of Master of Arts in many colleges and universities. Different candidates in turn took responsibility for certain sections of history — movements, epochs, or other units — and were questioned sharply by the other members of the class, who now constituted the committee. The same teacher organized a class in European history into a dramatic club, and staged, in successive one-act plays, and under the authorship and direction of members of the class, most of the work of modern European history. Still another teacher quite frequently divided his classes in French into sections which selected leaders who shouldered the responsibility, through planning and guiding the mastery of certain portions of the work of translations or grammar, for promoting the progress of the respective groups. In each instance the form of organization was just such as appeared usable, and there

were no extras. There were no excess officers or committees casting about for work to do. There should be few standing committees. Committees should be appointed only as need for them arises. They should be appointed for special tasks, and discharged when these tasks are completed.

There seems to be a glamour for young people, which some never outgrow, about organization and formal ritualism, and a thrill that comes from elections. This must be guarded against, lest it misdirect the activities and interests of the pupils. If interest centers upon the organization as such, as soon as the novelty wears off the teacher will find that he has a problem on his hands. Every effort should be expended to keep the facilitation of the work of the class the objective. To be sure, an enjoyment may be found in a variety of procedures that is both legitimate and desirable. Even adults demand this. Still, the extension and complication of organizations can hardly be justified on the basis of the pleasure young people may take in them.

Keep nature of the work in view. In many instances the nature of the subject-matter will be such as will permit the effective imitation of some existing adult organization, as a literary club, a city council, a legislature, a courtroom, a newspaper, or a business concern. Whether or not this shall be done, though, is a question which the teacher must think out carefully. The teacher must be able to forecast how well the work may be facilitated thereby, to image the results with the class, to estimate its suitability, and to foresee what adaptations may be advisable and to provide for them.

In case it is decided to employ the form of some existing organization, it is usually profitable to have a committee, or the entire class, gather detailed information about it as a basis for the class organization. Occasionally different committees may study two or more organizations, and

report on them, with recommendations to the class. As a usual thing this procedure is not to be recommended. Classes are likely to differ over the adoption, and the subsequent attitude of some pupils will be affected adversely in consequence. Not too much time should be spent in planning any form of organization, as there is likely to be much waste effort in doing this.

In case no suitable existing form suggests itself, or in case it seems that an organization might be worked out which would be more useful than any which they might adopt outright, the work of doing this should be made a valuable exercise. From many points of view it is one requiring considerable tact and judgment. Quite often, too much time is spent on the preliminary steps in working out the plan of organization, as the appointment of committees on constitution and by-laws, and the reading, discussion, and the adoption section by section of the constitution, and law by law of the by-laws. Unless care is taken in shaping this preliminary work, an entire class period may be spent in the discussion of one or two sections. This is too wasteful a method to follow. Often, on the other hand, a committee is appointed which works out the plan of organization, and reports it in class the following day. The plan is then adopted, officers are elected, and work is outlined and begun — all in one class period.

Whether or not this short-cut procedure can be employed depends somewhat upon the nature of the work of the class, and the plan to be employed. Usually, though, the time spent in getting the organization may be reduced to a fraction of what it otherwise might have been by the exercise of a little advance planning by a clear-headed and skillful teacher. Not too much irritation must be shown with the misguided efforts of serious but inexperienced youngsters, and yet a somewhat direct method of speeding

things up must at times be employed. A clear-cut, business-like attitude, not too apologetic, yet not too ruthless, usually is very effective. High school students, while desirous of expressing themselves, nevertheless become impatient with too much beating about the bush, and respond to leadership in instances of this kind. It is good, too, that they be trained to do so. To be sure, the bulk of the work of the teacher will have been done with the committee before its report is presented. Perhaps it is better for the teacher to point out the defects, and the need for a modification of proposals, rather than to assume too much responsibility for constructive work. Where it seems necessary to do this, the suggestions should be considered on their merits by the committee, or the class, without the feeling of undue influence by the teacher. A good sense of proportion will assist the teacher in preventing the class taking the work of organization as too heavy a matter. They should also be led to feel that changes and modifications may be made from time to time, as needed.

The student representatives. The next step is the selection of the first set of officers. Very much of the ultimate success of the plan depends upon the examples and standards set at the outset, and upon the initial success of the innovation. The instructor should stimulate the class to deliberate upon the duties of the various officers, and to select those who will in all likelihood make excellent ones. It is excusable and probably advisable, in the case of some classes, for the teacher to appoint the first staff, probably with the advice and consent of a committee elected by the class.

It now devolves upon these officers and the teacher to plan and make an effective start. It should be kept in mind that, however much this type of socialized recitation may contribute to increased effectiveness, it is never to be re-

garded as a means for making teaching easier for the teacher. It is quite necessary, especially at the outset, that teacher and chairman or presiding officer confer frequently as to the plan of procedure.

The conferences. If the regular leader is to be relegated to the side lines, the student substitute must be given special coaching. There will be need for discussing with the chairman or student leader on such points as:

1. The general nature of the activities to be undertaken.
2. The essential points of emphasis.
3. Plans for an equalization of opportunity and burden within the class.
4. Plans for retaining the coöperation of indifferent ones.
5. Plans for summary, and visual presentation.
6. Plans for fixing facts and developing skills.
7. The order of business for the day.
8. The responsibility of officers to the will of the group.
9. Special problems.

It is desirable at the outset, and to a limited extent later on, for the chairman and the teacher to work out a fairly detailed plan of procedure — much like a lesson plan. As soon as possible the chairman should take the initiative in such plans, work them out, and then present them to the teacher for approval and suggestion. The detail and the frequency of these conferences will vary with the maturity of the class, with the resourcefulness and personality of the officers, and with the nature of work to be done.

There is a danger of too liberal use of advice and suggestion. Officers must not be permitted to come to the conclusion that they are mere puppets; they must not be ignored or repressed. The success of the plan is in direct proportion to the feeling awakened that they have assumed the responsibility of the enterprise, and have a prominent part to play in the management of it. However, in this connection, it probably should be mentioned that it is not

wise for the teacher to make any definite announcement that the management will be turned over to the students. In case it becomes necessary afterward to guide the work with a rather firm hand, such a preliminary announcement becomes embarrassing. Rather should the pupils feel that the actual authority remains with the teacher, even though the class be permitted to exercise it quite fully.

Rotation in office. Officers should not be continued in office indefinitely. The opportunities and burdens of leadership should be distributed. Even the least promising pupils should have some share in it. On the other hand, changes in staff should not be made so frequently that the organization is constantly in the hands of new leaders. The training of each new set of officers is the first care of the teacher, though the necessity for such work will diminish somewhat as the pupils have opportunity to witness good examples and standards.

It is absolutely essential, in the early stages, that the interest of the group in the success of the venture be strong, and that the welfare of the enterprise be at all times a matter of concern. The group must take pride in their project. The work of the leaders and the coöperation of the unsocial will be influenced greatly by the strength of the social approval or disapproval of the class members.

Much of the foregoing discussion has assumed the use of the formal organization over a considerable period of time. There will be many occasions where it will seem profitable to employ an organization or formal plan for merely a portion of a class period, or for a class period or two. Many teachers employ the formal method only occasionally for review exercises. In classes where current events are given a class period once a week, the formal plan may be advantageously used on these occasions.

3. *Operating the informal type of socialized procedure*

The informal group. A class may be transformed into an informal, socialized group without the necessity for any radical reorganization. Few preliminaries and no special machinery are required. Indeed, it is the natural tendency for recitations to become socialized in some respects, and only the formalism employed by the teacher tends to prevent this. A skillful teacher can make the transition with no consciousness on the part of the pupils that any innovation is taking place. The class control only needs to become more natural and less militaristic, and the amount of student responsibility delegated may be adjusted to the apparent chance for success. The instructor remains in a position where leadership may be readily exercised, and at any time and with little ostentation. The amount of waste may be minimized, since the directing hand of the teacher may function at the proper moment and with little or no appearance of intrusion. The interpretation and judgment of the instructor, from time to time, is then more readily exercised, and a better opportunity is afforded for a skillfully yet unobtrusively guiding of the discussion toward the important points and into the problems of most worth. The instructor may at any time raise a question and recede to the background, simply acting as a chairman or referee and permitting the discussion and development to go on in a natural manner. Occasionally it will be necessary to give a new direction to the trend of the discussion, occasionally to suggest a new angle of the problem or a new problem, and occasionally to draw into the discussion some who have not been participating.

The informal type of procedure thus has certain advantages over the formal plans for socialization. It resembles very closely a natural conversational group, and its very naturalness and spontaneity recommend it. It is not

unlike the seminar group, or a committee meeting. Members speak when they have ideas, rather than when they are called upon. This opportunity for participation at the right moment serves to stimulate interest. It is probably because of the opportunity, and because of the natural and psychological development of the topic under discussion, that the interest evinced by members of such groups is distinctly superior to that of the ordinary recitation. It is only natural that the interest would be greater. The informal group plan is well adapted to small groups; with large groups it is difficult to prevent confusion.

Many teachers will feel that there is nothing new in such a procedure, as they commonly make more or less use of such technique with no idea of its being a "socialized" recitation. There is nothing new in the idea of the socialized recitation, except the new attitude toward making its use more common and more effective. The fact that it is not new does not in the least detract from the desirability of making more use of it than has been done.

Technique of the informal group plan. There are certain suggestions on the technique of conducting the informal plan which merit consideration.

In the first place, the instructor should constantly restrain himself from a natural but an unfortunate tendency to monopolize the discussion. Many instructors are unable to stand by and see the work apparently "go to pot." It is natural for the teacher to overestimate the importance of and need for his own contributions. It is difficult to realize that the shortest way is not, in the long run, the most economical way. The learners must participate, even though they do make mistakes. Even the most scholarly presentation and explanation by the instructor often does not result in the most satisfactory learning. The extra-subject-matter values of the socialized recitation are

important, and should not be lost sight of. The development of initiative, thinking power, right habits, power of expression, ideals of polite conversation, coöperativeness, and similar special outcomes of the socialized procedure should not be lost in the process of acquiring a better grasp on information.

In the second place, the instructor must at the outset train the class in proper methods of procedure. Not more than one student should talk at once. Each one should be allowed to conclude his remarks, without interruption or interference. Students must be trained to realize that time is available only for worth-while discussion. Ideals of courtesy must be held before the class in a favorable light. Kindliness and fairness must be observed. Scolding or sharpness should not be resorted to; a smile or a disappointed look may serve much better than words. The integrity of the group must be preserved — the group spirit — the “we” spirit. All this requires skillful and tactful management — even more so than in the traditional recitation.

The instructor must acquire skill in directing the trend of the discussion by raising, defining, and modifying questions and problems, and by keeping the class as much as possible in a problematic attitude. He should refrain from settling questions by authority; rather he should lead the class to think them through. This requires familiarity with the subject-matter taught, and careful daily planning.

Members of the group must be led to address themselves to the group, rather than to the instructor. This is one of the earmarks of a truly socialized class. The teacher-individual relation must give way before a project-group relation. Until this is accomplished, at least partly, no truly socialized atmosphere can be obtained. Often this is difficult to accomplish, and the instructor must give it attention from the start. It is not done so much by precept

as by making the discussion of such a nature that it will be natural for each pupil to address his fellows. A favorable seating arrangement is very useful. Seating the pupils around a quadrangle of tables or in a circle is very helpful, and is employed by many teachers even where no definite attempt at complete socialized procedure is made.

In order to carry out the audience-situation described above, and for other reasons, it is desirable to arrange to have pupils make contributions not already known to the rest of the class. Those teachers using no special textbooks, but instead an assortment of texts and references, find students much more desirous of reciting, their recitation work much more earnestly done, and their fellows much more interested because they have something to say which is not known by all the others of the group.

4. *Dangers and limitations of socialized procedure*

Cautions as to procedure. As previously suggested, the successful socialization of a class is no task for a weakling. It requires greater skill in teaching than does textbook teaching. It is attended by many dangers, and requires skillful management. There are some dangers and limitations that are to be encountered in ordinary classroom situations, and certain ones which are peculiar to the socialized methods.

Freeland, in his *Modern Elementary School Practice* (Macmillan),¹ lists the following suggestions for meeting special classroom difficulties:

1. In developing larger responsibility and more coöperation on the part of the youngsters, the teacher should be careful not to turn the class over to a "bright" pupil who in turn becomes a sort of teacher.
2. The teacher should not allow the timid or sluggish child to

¹ Reprinted by permission of The Macmillan Company, publishers.

withdraw from the work or become a mere auditor, but every means should be used to bring such children to the front.

3. The serious work of the subject-matter should not be neglected, or any sort of pseudo-parliamentary drill be allowed to become the end of the organization. Recitations are socialized in order to take better care of the regular school work — not to take its place.
4. In all of the work the teacher is a constant factor. The children should realize that the freedom of the new order is theirs only if they use it wisely.

The tendency toward monopolization. One of the dangers in using socialized procedures, against which the teacher must be constantly on guard, is the tendency for the officious, the domineering, or the conscientious but self-centered individual to dominate the group. Whenever human beings gather in groups, for any purpose, it is not long before some one or ones have assumed leadership and pushed others more or less into the background. In the business, civic, and play groups of adults, as well as among children, this can be easily noticed. The traditional recitation suffers from the tendency of a few pupils to monopolize the class hour. The socialized recitation, if not managed carefully, may make matters worse, since the teacher is no longer in a position to bring all members of the class into action. In fact, just this situation has been encountered very frequently where socialized procedures have been employed. This situation may result as the natural consequence of the activities of domineering and officious pupils, who delight in sheer domination, but it frequently comes about also as a result of the efforts of conscientious pupils to see to it that the venture goes well.

In case the formal plan is being followed, the student chairman or leader must devise means by which the too-active individual may be sidetracked or ignored. For doing this, positive means are better than negative. It is better

to bring about the retirement of the offender to a position of less participation as the natural consequence of the increased participation of others. In case the chairman does not sense the situation, or does not rise to the occasion, it becomes the task of the teacher to go into the problem in private conference with the chairman, and to suggest means for an improvement in the situation. In case the leader himself is the offending member, a frank, friendly talk, pointing out the advisability of more evenly distributed participation, "even though it may not be so well done," may be very helpful.

Under the informal plan, the matter can be handled directly by the teacher by addressing himself less frequently to those who tend to monopolize, and more frequently to the less active. If the situation is brought about by a domineering pupil, who fails to respond to ordinary strategy in the routine of the class, he should probably be handled along with the pupil who was born to be a clown or a humorist. A frank private conference should be provided for, and the pupil who will not "socialize," after such procedure has been resorted to and appeal has been made for coöperation and fair play, should be subjected to such measures as are commonly employed for disciplinary problems where the usual recitation plan is being followed.

The tendency toward rambling and unwise discussion. The fears of the conservative teacher that there will be much rambling and digression, and that time-consuming discussion of irrelevant or minor points will prove a source of waste, are frequently realized. There is necessity for guidance by some one who has a sense of values and proportion. Careful coaching of student teachers will operate to reduce the amount of this sort of thing. It will become necessary for the teacher at times to participate in the discussion long enough to direct the thinking back into more profitable channels. This, of course, must be skillfully though firmly

done. Not too much irritation must be felt at the tendency of pupils to digress; if they were perfect in this respect there would be much less need for the teacher.

Controversy in class. As in the older type of recitation, discussions which take the form of a controversy occur quite frequently. As a means of promoting interest controversy often is quite effective, as it tends to heighten the attention of the listeners as well as the participants.

There are dangers, however, that need to be guarded against. Dickerson has well pointed out that controversy, while having certain values as a means of learning, is prone to become an emotional rather than an intellectual matter, and may serve prematurely to fix participants or even listeners in definite attitudes on questions, and to blind them to those considerations which do not contribute to their position. It might be pointed out, too, that often a controversy reaches a point where no new material is developed, and it continues only as the asserting of opinion and the reiteration of previously considered points and arguments. Again, if not managed well, it tends at times to transcend the bounds of polite discussion, and to engender individualistic acts and feelings which contribute nothing to the development of that social spirit which should characterize all socialized procedure.

Repressive supervision. As suggested in the preceding chapter, considerable judgment must be exercised as to what extent the teacher shall participate in guiding and planning the work of the socialized recitation. In the formal plan it must stop short of that point where the student officer ceases to call upon his own initiative, and where the class begins to feel that their organization is a mere show and that they are being hoodwinked. The manner of giving counsel and direction must be as unobtrusive as possible, and must be planned so as to leave the pupils with as much of an idea as

possible that they are bearing the major burden. In case of doubt, it is usually safe to err on the side of throwing more responsibility on the pupil. Teachers seem by very nature inclined toward a paternal (or maternal) despotism, and seem to have little faith in the necessity of exercise for the development of a sense of personal responsibility.

Where the informal plan is used there is a distinct necessity for stifling many impulses to rush to the rescue, to set the wrong thing straight, to take back the reins, and to overshadow the officers. Where teacher participation seems absolutely necessary, it should be done with as little display of authority as is possible. In either type of organization, participation on the simple basis of an ordinary member of the group may be most helpful. It is also wise to withdraw from the focus of attention as soon as the necessary guidance has been given.

Inadequate selection and emphasis of subject-matter. Just as pupils are likely to ramble from any given topic, so there is a danger that the student leaders will not follow the course of study. There are two things that should be noted here.

One is that perhaps not following the exact order of the course of study is not in itself a source of waste at all. Perhaps in another city, obtaining just as good results in school work, the course of study is somewhat different. It is very hard to justify the relative superiority of any one course of study. It is probably better to follow a psychological order with keen interest than to stick to a set order with lower levels of interest. We are beginning to recognize that too much importance has in the past been placed on logical organizations and schemes of subject-matter as such.

The second fact worth noting is that it is not without the province of the teacher to suggest and influence not only the order of topics taken up, but the selection of what shall be

taken up, and the relative emphasis that shall be given each. In most cases students, like teachers, are likely to follow the textbook fairly closely anyway.

There is also danger that improper emphasis and perspective may result — that students will leave the discussion without having obtained a clear-cut conception as to the important items studied, and their relation to one another. It is by no means to be assumed that they always obtain such under the older methods of teaching. In many classes where socialized methods have been used there is employed, by way of caution, a plan of having a “summarizer” — sometimes a student, sometimes the leader, sometimes the teacher, and especially the teacher when dealing with younger pupils — who at the close of the period organizes and summarizes the work covered and calls the attention of the class to the points needing emphasis.

Lack of thoroughness in subject-matter. Teachers are quick to question whether socialized learning will be as thorough as is desired. Contrary to the expectations of many, at least where as much skill and effort are exerted as in using traditional methods, a lack of thoroughness is not evident. The fact is that the increased interest tends to result in increased retention.

It is not to be supposed that there will be no drill in the socialized recitation. Some of the most interesting socialized procedures the writer has ever witnessed have been socialized drills, where students were drilling each other — sometimes by means of games, sometimes as a preparation for a group contest, and sometimes to reach a certain standard or to pass a certain test.

Danger of discouraging the slow pupil. In the formal plan there is need to see to it that the slow or the “temperamental” pupil is not discouraged. These pupils, often problems for the teacher when in charge, may become even

more so when a less diplomatic and less skillful student leader is in control. Experience shows that when the informal plan is employed these pupils often are drawn into the discussion more readily than when the more formal recitation plan is followed.

In those instances where the impatience of the leader or associates, or the indirect criticism of the group, is seen to operate to disadvantage for the slow, the timid, or the sensitive pupil, suggestions to the leader or to individuals of the group may be the most effective means for improving the situation.

"Half-baked" socialization. The socialized recitation has not escaped the misfortune that besets all new procedure in educational methods. Regarded as a fashion and a badge of progressiveness, many teachers cause their classes to assume the form of socialization. Where the form merely is imitated, and there is little understanding of the real spirit and fundamental principles of the movement, the educational results are not likely to be satisfactory. Parents and teachers soon lose faith, regard the new movement as only another fad, and fail to realize the true social significance of it.

It must be remembered that merely turning a class over to student representatives, or merely permitting students to conduct recitations, does not in any sense of the word constitute socialization. There is always the tendency to emphasize the showy, the spectacular, the unusual, and the material phase of any new movement in teaching. Neither the real objectives of the socialized recitation, nor the subject being taught, must be lost sight of. Where this is done, the "socialized recitation" will soon degenerate into a type of activity of less value than the conventional recitation. Mechanical and trivial corrections of students by one another are likely to constitute the "socialization."

Ruediger quotes, in his *Vitalized Teaching* (page 97), a stenographic report of a socialized recitation, a portion of which was as follows:

Joseph: Lillian, you said Major Pike tried to climb the mountain. We are talking about the peak.

Mary: Joseph, say mountain, not mountin.
(Joseph repeats the word.)

Alma: Lillian, you said that the railroads go around the mountain until they get to the top. It would be better to say that the railroads go around and around until they reach the top.

Louis: Lillian, you said a peak is the higher part of a mountain. I think it is the highest part of a mountain.

Ruediger says of this sort of thing that it is "hardly fair to call this a socialized recitation; it is a lesson in heckling." The teacher must first understand and appreciate the spirit and aims of the socialized recitation, and then adjust all procedure to bring it into harmony with them.

Developing unsocial attitudes. At times, cliques, inner circles, and groups of friends will be seen to develop who allow their membership in such groups to influence them in their membership in the socialized recitation. This is a difficult situation to handle, and requires very keen diplomacy to avoid making matters worse. Sometimes feeling remains after an election of officers which makes it difficult indeed to attain the desirable social morale. This kind of situation is not so likely to result in the informal type as in the formal type of socialized procedure.

The socialized recitation is no "sure-fire" cure. There will be pupils who will not respond and shoulder responsibility, either as individuals or as members of the group. It must be remembered, though, that this problem has by no means been solved under the recitation plan. It is not likely to become aggravated under socialized procedure. Very often, upon being elevated to a definite post of re-

sponsibility, the attitude of "problems" will improve. Often it is necessary to resort to old-fashioned direct methods, though results obtained from such are quite likely to be temporary, as usual.

Socialization and poor discipline. It has become a custom with many uninformed people to think of socialized procedure as a sort of extreme democracy, likely to result in anarchy. Particularly are those teachers likely to be doubtful of socialized methods who belong to that rapidly diminishing group who have a blind faith in discipline for discipline's sake, and who do not judge discipline or order in terms of favorable educational situations. They are likely to minimize the value of training pupils to govern themselves, and are likely to emphasize the desirability of preserving order in order that the geography may be learned by repression and fear. It is indeed unfortunate that such methods have not before now resulted in the better learning of the geography.

It must be clearly understood that socialization does not mean chaos. Instead, it means an orderly program, carried on in an orderly manner by orderly students. It does not contemplate turning the class over to its own devices and whims. To be sure, there will often be confusion when introducing socialized methods, and while learning new procedure and new responsibilities. There will naturally be some lost motion, and the novel order of things may result in some necessary agitation. However, any fair judgment of the plan must await a fair and continued trial, and one of such a character as will permit both student and teacher to acquire something like the same degree of proficiency in the new methods that has resulted from years of practice under the older ones. Teachers will need to experiment with the new method, and gradually to perfect their skill in its use. Pupils who have been taught only by

individualistic pressure from the outside, and by spoon-feeding methods, naturally will require some time to perfect the use of their privileges of initiative and to grow to their responsibilities. In many instances the use of a socialized method will mean a temporary loss in teacher discipline, and possibly in subject-matter learning as well, as the first step toward an ultimate gain of powers of independent study and of permanent interests which will continue to function long after the special subject-matter has sunk below the power of recall.

5. Examples of socialized procedures

Review procedure. It should be recognized that there is no set stereotyped form of socialized recitation, and that it is not often wise, even if possible, for one teacher to follow exactly the procedure employed successfully by another, even in the same school subject. However, suggestions may be obtained from the technique of others, even if the duplication of procedure be impossible or impractical. The following procedure has been suggested, by Kendall and Stryker, in a volume on the teaching of history:

Let the class prepare to teach the lesson, and come with questions to ask and problems to be settled. Different pupils may preside during the period. Questions are propounded for open class suggestion. Various points may be taken up in argument, and the members of the class will seek to convince one another.

This method of recitation is well suited to reviews, where the class is already in possession of a certain amount of definite information; or it is useful when the textbook lesson offers material that has in it some debatable questions. Such a lesson as the period after the Civil War known as the Reconstruction Period, which involves a discussion of the treatment of the South by Congress and the difficulties that led to the impeachment of Andrew Johnson, would

be excellent material for a socialized lesson. The Critical Period after the Revolution, when the colonies endured the chaos and disorder which resulted from inefficient government, is another interesting topic that would work well in a socialized recitation.

The authors just mentioned also suggest another device for socialization, as follows:

Members of a class will enjoy personifying speakers in the British Parliament who are urging the passage of the Stamp Act, as well as their antagonists in America who are advocating its repeal in the Colonial Congress.

In the same publication is found a chapter on "Dramatization" as a device for teaching history. Its values in promoting keen interest and activity, resulting in vivid imagery, and in transforming the attitude of pupils toward school and the history recitation, are pointed out.

Socialized review devices. The following device for a socialized review may be used in the teaching of almost any high school subject. Pupils are urged, a day or two previously, to prepare and submit questions relating to points in the unit of instruction just completed which presented any difficulties, or concerning which more information might be desired. From these the teacher should prepare questions, enough to amply require the time of the period, and then arrange them in a pedagogical order or in the order of their importance. Care should be exercised in the selection of questions which do not overlap, which will provoke thought, which are likely to be stumbling blocks to several pupils, and which bring out important points and points contributing to the purposes of history teaching.

At the beginning of the period two officers are elected, a "judge" and a "conductor." The conductor reads the questions. All who can answer will stand. The judge then calls upon one of these. At the close of the remarks of this

pupil those who are not satisfied with the answer may rise, and, upon being recognized by the judge, may give additional information, explanation, or opinion, or may ask the pupil just reciting any question that may seem appropriate. The judge (or the conductor) may rule out any question, or remarks which seem unnecessary or inappropriate. Disagreements within the class, when not settled by the speakers from the floor, are to be settled by the judge or by the teacher. A summary of the answers to the questions raised may then advantageously be made.

The author has witnessed this method used several times, with very successful results. A variation which stimulates interest consists in having all pupils, who rise to signify their ability to answer, remain standing until they can no longer make any correction or add any significant fact. This device usually improves in effectiveness with continued use.

Other socialized lesson plans. Mackie describes a type of socialized recitation which he has used with success, as follows:¹

The lesson is divided into four or five parts and a leader is assigned for each part. The duty of each leader is to outline his part of the lesson, prepare questions, and gather outside information pertaining to every subdivision of his outline, and bearing on all the questions he has prepared.

In the recitation, the leaders who have made special preparation are requested to question the class, as the teacher might be expected to do. Volunteers are not called upon until two other pupils have attempted to answer the question. If two students do not satisfy the leader and other students, volunteers are called upon to correct any errors or give additional information.

The members of the class are allowed to ask any questions not previously made clear, or they may present new questions. Then volunteers present new material based on collateral reading. The leader finally offers his additional information. In case all the im-

¹ From *Historical Outlook*, vol. 10, p. 257. Quoted by permission of the publishers, The McKinley Publishing Company.

portant points are not brought out clearly, the teacher asks his questions in order to emphasize those essentials.

Conversations and discussions are transferred to the class circle. Discussions, questions, criticisms are between pupils, with the teacher only occasionally drawn in. . . . The teacher is a guide and does not do the reciting for the class. He encourages both freedom and desire to offer additional facts, or to make inquiry concerning points discussed. Corrections are noticed and discussed by the pupils. . . . The teacher corrects errors and supplements the work of the students. However, he takes part only when necessary. The teacher merely directs the work, counsels with the pupils, advises and leads without dominating and suppressing the physical and mental life within the room.

In his article (see references) Mackie points out the advantages which he believes to result from the use of his method, and there is attached a short article by a pupil on "The Socialized Recitation from the Student's Standpoint." The student attests to the increased interest, increased preparation, and special values of the socialized procedure.

Harrighurst reports a plan with which he has obtained very good results. The recitation was divided into five parts:

1. *Special reports*, by some members of the class assigned several days previously by the instructor, followed by discussion and questions from the floor. (Ten minutes.)
2. *Discussion* of problems and questions raised and scheduled for discussion, on previous day. (Ten minutes.)
3. *Topical recitation* of topics agreed upon by class as the topical divisions of the unit of work. (Twelve minutes.)
4. *Teacher's summary and discussion* of work of the day, with special reference to inaccuracies, weak points, and points of importance and emphasis. (Six minutes.)
5. *The assignment*, or really the coöperative statement of questions and topics to be taken up under parts 2 and 3 on the morrow. (Five minutes.)

Time divisions were not followed uniformly, but approxi-

mately. Danger of prolonging the early parts of the recitation must be guarded against.

A president and secretary were elected for a term of two weeks, and these were not eligible for reelection. The president guided the work of the day, and assumed the general responsibility for the success of the lesson. He appointed leaders daily for parts 2 and 3, and acted as a general manager. The secretary kept the roll and attendance, and looked after the library readings. He also kept a record of leaders and participants, for reference by the president and the teachers. The leaders appointed for the daily discussion and topical recitation had charge of the calling upon other pupils to take part, and guided the discussions while they were in charge.

A socialized history lesson. Wells describes a socialized project in American history,—that of reenacting the constitutional convention. A detailed description of the procedure would require more space than is available here, and the reader is referred to his article, as cited in the references at the close of this chapter.

The members of the class assumed the parts of delegates to the convention. Some were assigned definite characters to impersonate. The convention was organized and officers elected. Each delegate studied, in the text and in collateral references, as to what part he should most likely play. Convention and parliamentary procedure was followed. The various questions which came before the original convention were discussed. The positions taken by delegates were dictated in part by the interests of the States they represented as they conceive them to be, in part by their own views on the matter, and sometimes by the positions actually taken by definite delegates. The great compromises on the basis of representation, the regulation of commerce, etc., were reenacted, with all the arguments pro and con.

Debate as a socialized procedure. Another form of socialized procedure is the debate. Its values — the development of fluent and forceful expression, the awakening of self-confidence, training in logical and spontaneous thinking and reasoning, inculcating habits of self-control and poise in argument and controversy, awakening increased interest, and serving as a motive for study — have not been unappreciated, and the method is quite widely used by teachers of history, literature, science, and other content subjects.

As in the case of the use of dramatization, the debate must be so handled that the preparation does not exact time and effort out of all proportion to its value as an educative device. The use of notes should be encouraged, rather than verbatim memorization, yet the preparation must be sufficiently well done to involve a fairly thorough study of the facts and arguments involved in the question. A special feature of socialization is the provision for members of the class, not actually speaking in the debate, to assist those who are.

Benjamin reports a variation of debate-form which possesses unique advantages — the “Socratic” debate. After one speech on each side of the question, each member of the teams in turn is given an opportunity to question a designated opponent, for a limited period, in a manner designed to bring out the weakness of the opponent’s position and the strength of the argument of the questioner’s side. The questioned pupil must answer briefly, and must not exceed the bounds of the question.

At the conclusion of the round of questioning, one speaker from each side gives a rebuttal speech. A number of possible variations of this procedure may occur to the teacher using it. It might be followed by questions from any member of the class, asked of a member of one team or

another, or to be assigned to the appropriate team in case no volunteer offers to answer.

Other devices. The device of the Master's examination, referred to early in this chapter, may be utilized in almost any subject. The resolving of the class into any type of body — legislative, civil, religious, or otherwise — may always be considered. The holding of elections and campaign speeches, either on present issues or as a reënactment of campaigns now in history, may be profitably employed.

However, as a steady diet, the informal group discussion, guided but not dominated by the teacher, with freedom of opinion and speech, and where quizzing as such disappears and where the interest of pupil and teacher are obviously consistent, has many advantages and is open to fewer of the criticisms made of socialized procedure than are the more highly organized devices. The socialized situation which is so likely to be followed in group projects is a delightful thing to see, and at the same time is a fruitful educational practice.

QUESTIONS AND EXERCISES

1. Think of at least one institutional form which a class might imitate, in socializing the class procedure of your teaching subject.
2. What would you advise a high school teacher to do who complains that all the students want to talk at once, and that they interrupt each other? What are the strong and weak points of the procedure you recommend?
3. How would you prevent monopolization of class time by a few students:
 - a. If you were using a formal type of socialized procedure?
 - b. If you were using an informal type of socialized procedure?
4. Do you believe on the whole that it is wise to permit controversy between pupils in class? List the values and dangers of such a method, and some suggestions for handling it, if it is permitted.
5. Evaluate each of the socialized devices described in the latter part of the chapter. To what extent would each be usable in your teaching subject?
6. Think out three socializing devices for teaching your subject.
7. Why will many experienced teachers and principals be hard to convince of the merits of socialized procedure?

8. List what seem to you the five most important cautions to teachers intending to use a plan of:
 - a. Formal socialized procedure.
 - b. Informal socialized procedure.
9. Evaluate each of the dangers and limitations of socialized procedure, as mentioned in the chapter.

SELECTED REFERENCES

- Adams, John. *Modern Development in Educational Practice*. Geo. H. Doran Co., 1922.
See Chapter VI, "The Knell of Class Teaching."
- Baker, B. M. "Some Viewpoints of the 20th Century School"; in *Kentucky High School Quarterly*, vol. 4, pp. 2-11. (October, 1920.)
Address before Maysville, Kentucky, Club, April 3, 1920, "The Socialization of the Modern School and the Closer Relationship to Society."
- Benjamin, H. R. *The Socratic Debate in the High School*, vol. 2, pp. 13-15. (December, 1924.)
- Burns, Hazel F. "The Group Socialized Recitation"; in *Education*, vol. 39, pp. 176-81. (November, 1918.)
- Field, Byron F. "How to Add Vitality to Civics Instruction"; in *Historical Outlook*, vol. 15, pp. 75-80. (February, 1924.)
Worked out a civics senate and school city to illustrate facts and knowledge in civics class.
- Freeland, Geo. E. *Modern Elementary School Practice*. The Macmillan Co., 1919.
Chapter XVI, "The Socialization of Instruction." Socialization of school, room, and class. See also pp. 328-38.
- Johnson, W. H. "The Socialized Recitation in the High School"; in *School Review*, vol. 32, pp. 682-87. (November, 1924.)
A report of a quantitative experiment to furnish data on the efficacy of the socialized recitation as a means of teaching mathematics.
- Kendall, C. N., and Stryker, Florence E. *History in the Elementary Schools*. Boston: Houghton Mifflin Co.
- Lull, H. G. "Socialized School Procedure"; in *American Journal of Sociology*, vol. 24, pp. 681-91. (October, 1919.)
- Lull, H. G., Kyte, George, and Wilson, H. B. *Modern Methods of Teaching*. New York: Silver, Burdett & Co., 1924.
Chapter V, "Socializing the School Work."
- MacArthur, C. G. "The Scientific Teaching of Science"; in *Science*, vol. 52, pp. 347-51. (October 15, 1921.)
Values of group discussions in science teaching.

- Mackie, Ransom A. "The History Recitation Socialized"; in *Historical Outlook*, vol. 10, pp. 256-58. (May, 1919.)
- Montyne, Edwin Y. "The Socialized Recitation"; in *Journal of Education*, vol. 92, pp. 340-42. (October 14, 1920.)
- Nolan, Ona I. "The Socialized Program Adapted to the Intermediate School"; in *Journal of Education*, vol. 92, pp. 371-78. (October 21, 1920.)
- Peckstein, L. A., and McGregor, A. L. *Psychology of the Junior High School Pupil*. Boston: Houghton Mifflin Co., 1924.
Chapter XIV, "Socialized Procedure in the Classroom."
- Pendleton, C. S. "The Socialized Recitation"; in *Proceedings of the National Education Association*, 1920, pp. 416-18. Or in *American Education*, vol. 23, pp. 307-12.
- Pierce, Bessie L. "The Socialized Recitation"; in *The Historical Outlook*, vol. 11, pp. 182-93. (March, 1920.)
- Pierce, Bessie L. *The Socialized Recitation*. University of Iowa Bulletin No. 81. Iowa City, Iowa, 1922.
Practical suggestions and very definite helps.
- Robbins, Charles L. *The Socialized Recitation*. Boston: Allyn & Bacon, 1920. 100 pp.
Probably the one best discussion of socialized procedure.
- Ruediger, Wm. C. *Vitalized Teaching*. Boston: Houghton Mifflin Co., 1923. 110 pp.
Pp. 91-100, give good example of how not to conduct socialized recitation.
- Smith, W. R. *An Introduction to Educational Sociology*. Boston: Houghton Mifflin Co., 1917.
Chapter XIX, "The Socialization of Teaching Methods."
- Stormzand, Martin J. *Progressive Methods of Teaching*. Boston: Houghton Mifflin Co., 1924.
Pp. 268-88, "The Socialized Recitation."
- Taylor, W. W. "Some Points in Favor of the Socialized Recitation"; in *Elementary School Journal*, vol. 22, pp. 766-80. (December, 1922.)
- Thomas, Frank W. *Training for Effective Study*. Boston: Houghton Mifflin Co., 1923.
Pp. 101-14, relation to interest; application to upper grade school subjects.
- Thorndyke, E. L. "Education for Initiative and Originality"; in *Teachers College Record*, vol. 17, pp. 405-16.

Van Denberg, Joseph K. *The Junior High School Idea*. Henry Holt & Co., 1922. 418 pp.

Chapter XV, "The Socialized Recitation."

Walters, W. W. "Pupil Participation and Socialized Instruction"; in *School and Home Education*, vol. 38, pp. 143-46.

Wells, B. M. "Socialized Recitation on the Colonial Question and Federation Period in American History"; in *Historical Outlook*, vol. 12, pp. 326-28. (December, 1921.)

Winston, W. C. "The Socialized Recitation"; in *Elementary School Journal*, vol. 22, pp. 575-83. (April, 1922.)

Advantages and methods are discussed.

CHAPTER X

PROBLEM TEACHING

1. *Problem-setting vs. arbitrary methods:* Arbitrary selection of subject-matter — Arbitrary methods in teaching — The new attitude — Problems as the starting-point of thinking — Values of problem teaching — Training pupils in problem-solving.
2. *Opportunities for problem-teaching:* Organizing courses on the problem basis — An example in problem-solving teaching — Future development of the idea — Problems in daily assignments — Problems in the class hour.
3. *Technique in problem-solving:* Types of procedure in problem-solving — Differences and similarities of the two procedures — Getting and keeping the problem in mind — Data in inductive procedure — Data in deductive procedure — Generalization in the inductive procedure — Inferring in the deductive procedure — Checking and verifying conclusions — Formulation of conclusions — Summary of processes in problem-solving — Function of the teacher in the problem-solving exercise.
Questions and exercises — Selected references.

1. *Problem-setting vs. arbitrary methods*

Arbitrary selection of subject-matter. Despite the fact that the demands for more practical curricula and studies in this country have resulted in the replacing of the old classical by a cosmopolitan type of high school, and an expansion of secondary school offerings to include such more useful studies as history, English literature, the different sciences, and certain vocational subjects, it can still be truthfully said that for the high school pupil the curriculum which he follows is largely arbitrary, and has been determined without much reference to felt need on the part of the pupils themselves. Subject-matter is organized into logical compartments and taught to students, previous to their experiencing the problems for which the subject-matter is proposed as solutions.

Two theories as to the educative process are here shown in conflict. On the extreme right is that steadily diminishing number of students of educational theory who have claimed that the attitude of the learner is of little account; that there is no need to worry as to whether or not the child sees the need of the subject-matter; that, in fact, the real values of the subject-matter — the disciplinary values — are best served if the child applies himself without any direct interest or incentive, or the feeling of any specific need. On the other side are those who have declared that the best preparation for adult life that the school can give is to teach the pupil to solve most effectively the problems of his life as he lives it. Others have gone even further and have denied that the school should have as its aim training for adult life; that child life is in itself worth while; and that no period of life should be sacrificed for any other period. It is quite likely, though, that our school practice will continue to be shaped by majority opinion. This still favors the viewpoint that childhood and youth are in large part periods of preparation for later life, and consequently that the youth must be prepared to solve the problems of life as he will encounter them, regardless of whether or not he can, in the stages of his immaturity, realize or feel such needs.

In the days when only conscientious and capable students went to high school, when the questioning of authority and tradition had not become common, and when social pressure to learn was a powerful factor, a reasonable degree of learning might take place even where the learner had not felt any specific need for the things being learned. There has come to be, however, rather general agreement to-day that the conditions for learning are much more favorable when the learner experiences a feeling of need for the subject-matter, and when the mastery of the subject-matter results in personal satisfactions. The more desirous the student is of

mastering a subject, and consequently the more wholeheartedly he applies himself to it, the more quickly and completely will he learn. The more satisfying the learning is to him as it progresses, also, the more vigorously will the learning be prosecuted and the more completely will it be retained.

Arbitrary methods in teaching. In the large majority of instances the subject-matter assigned, in taking it up at least, is without reference to any needs felt by the pupil. The lessons often seem as arbitrary tasks set by authority, for the doing of which there is no visible need. That they are performed by most pupils in a perfunctory manner is only a natural consequence. In many instances the tasks assigned are quite bookish, as: "take pages 44 to 49, read them over carefully twice, and learn the lesson thoroughly." The questions commonly given at the conclusion of chapters or sections in textbooks, notably the "search" questions in geography and history, are examples of this bookish and artificial practice, and are removed from life situations in which the subject-matter covered might be needed.

In the content subjects a definite goal toward which to work often is not present. The pupil is merely told to "learn" the lesson. No definite problems are set, and there is no objective means of determining when the work has been satisfactorily done. The student is given no voice as to methods of prosecuting the learning campaign, as he has no responsibility in its planning. He has no sense of partnership in the undertaking. It is the teacher's task to "learn me." No training in the directing of one's own effort is afforded. The pupil practices only the carrying-out of orders, and when the orders are misunderstood, lacking, or incomplete the work comes to a standstill. No training in independent work is contemplated; no opportunity for originality

is provided; no stimulus for thinking out ways and means of doing things is present.

The attention and efforts of the student, quite naturally, become focused not on the promotion of the learning, but upon satisfying the demands of the teacher. Fortunately, learning of a sort takes place even under these conditions, but how far short it falls from that which would result if the student shared the responsibility for the learning project, and bent his energies and efforts to planning the most effective completion of tasks which to him seemed worth while. While no doubt certain portions of some studies will always have to be learned by the personal-effort method, and we shall no doubt also have at times to coax, urge, and even threaten pupils through some portions of what is taught in school, the teaching problem nevertheless is — Can we, by better teaching procedures, materially reduce the amount of this compulsory type of teaching that must be done? The answer recently has been a decided yes.

Careful observations, from an unprejudiced point of view, bring to light certain inadequacies of the compulsory methods of teaching which still quite generally prevail. The attitude of the learner toward the material being learned, as well as the learning procedure, are now believed to be of much more significance in the effectiveness of instruction than was formerly thought to be the case. The perfunctory performance of school tasks, which when performed under favorable conditions might be expected to result in the mastery of valuable information or skills, is seen to be a source of much waste. Students spend an inordinate amount of time mulling through textbooks, with very little to show for their efforts, and because of their half-hearted attitude toward the work they are trying to do.

The new attitude. Psychologists and educators are

beginning to believe that, whatever may be the disciplinary values that result from forcing one's self, or being forced by threats and promises, to perform school tasks not in themselves engaging or seeming of direct worth, are after all offset by the results of such methods which must be charged on the other side of the ledger — loss in working efficiency, development of habits of divided attention, and unfavorable attitudes engendered toward the subject-matter concerned. They are also beginning to believe that the school must place more emphasis on teaching methods, in the attack and pursuit of school tasks, which train pupils for independence and initiative.

We have mentioned in a previous chapter that during the past few years there has been a strong and a growing tendency to reorganize both content and methods of instruction on the basis of psychological-challenging units, called variously — challenges, contracts, problems, projects, life-units, and otherwise. While not exactly synonymous, these terms involve common characteristics. They emphasize the shouldering of responsibility by the students in larger units than the traditional daily assignment unit. It is contemplated that the nature of the work itself, that is, the solution of the problems involved, should furnish the goal toward which the student should work, as well as the standard of attainment or success. Such larger-unit assignments are intended to operate in the direction of leaving more of the planning and oversight of the work of the learner to himself and his fellow learners in the group. They constitute efforts to produce learning-situations, where the efforts of the pupils are stimulated by a felt need, difficulty, or desire, rather than by the arbitrary assignment of tasks by the teacher. The remainder of this chapter will be devoted to a discussion of the problem as a teaching unit; the following chapter to the project, and a discussion of

the contract will be left to the description in Chapter XV of the Dalton plan, of which it is a part.

The problem as a unit of educational activity is probably the best adapted of all teaching situations to arousing genuine interest and purposeful, whole-hearted activity on the part of the pupil. It is believed that the study of educational materials, the participation in educational activity as the logical and self-chosen procedure in the solution of problems the solution of which has challenged the learner, possess values and points of strength which the traditional, arbitrary procedure does not.

Problems as the starting-point of thinking. John Dewey,¹ more than a decade ago, called our attention to the fact that thinking originates in some problematical situation. After a detailed discussion of the point, he continues:

We may recapitulate by saying that the origin of thinking is some perplexity, confusion, or doubt. Thinking is not a case of spontaneous combustion; it does not occur just on "general principles." There is something specific which occasions and evokes it. General appeals to a child (or to a grown-up) to think, irrespective of the existence in his experience of some difficulty that troubles him and disturbs his equilibrium, are as futile as advice to lift himself by his bootstraps.

The familiar saying, "necessity is the mother of invention," illustrates the point. When things are not satisfactory we begin to think about them in an endeavor to find a way out. The starting-point of thinking is the recognition of an unsatisfactory state of affairs, the unpleasantness of things as they are, or desires and how we might attain them. There are enough situations demanding adjustment, for which instincts and habits have no ready-made solution, to occupy us in all our waking moments. We are never satis-

¹ In *How We Think*, p. 13. Quoted by permission of D. C. Heath & Co., publishers.

fied. Thirst and hunger and positions of discomfort arise, were we so sluggish as to be otherwise content.

To normal human beings, though, there are always present problems of how to win social approval, how to avoid disapproval and loss of good opinion, problems of obtaining pleasures of that infinite variety to which human beings aspire, problems of home life and adjustment, problems of health, problems of finance, problems of occupational life, problems of preservation from accident and injury, problems of satisfying the impelling demands of curiosity, the desire for self-expression and power, and problems of sex relationships. Reflective thinking takes place when experience breaks down; when what has been permitted to pass for satisfactory no longer suffices. Problem-solving teaching may be said to consist in the raising of perplexity, confusion, or doubt in the minds of the pupils, and in such a manner as to challenge solution, and then supervising their efforts at solution.

Values of problem teaching. It is now proposed that much of school thinking should approximate the thinking of out-of-school life. It has been pointed out that there are certain features of thinking, done in connection with the problems of everyday life, which would enhance the value of school work could those features be made a part of it. The whole-heartedness of everyday thinking, and the seriousness and the vigor of it, are not usually found in our present-day high school work. How much more effective the work would be if boys and girls would throw themselves into the tasks of learning history and algebra with the same business-like earnestness which characterizes the planning of a merchant for the sale of his wares, a mother in the care of her children, or a student body in planning for a school "show." In such instances there is no need for prodding, for grades, for scoldings, or for any of the other artificial devices we use to stimulate flagging efforts to uninviting school tasks.

Where problem methods are skillfully employed, school work becomes much more pleasant and agreeable to both pupil and teacher. An objective aim, the solution of problems, assumes the rôle of taskmaster which the teacher has borne so long, and the teacher is relieved of the unfortunate position in which the traditional procedure has placed him. His seemingly arbitrary standards are no longer the source of difficulty and the cause of effort. The "breakdown of experience" for the pupil is not the result of arbitrarily imposed demands from another, but comes as the result of awakened desires for achievement and curiosity which call for the solution of problems that have arisen naturally in the course of school work. Their solution is now assumed voluntarily by the pupil, if not actually proposed or formulated by him. This change of attitude of the student toward his work and his instructor, and his increased share of responsibility for his own education, opens the eyes of teachers who have been accustomed to the traditional perfunctory attitude of students toward their school work. While this is an important outcome, it is not the only one arising from the use of the problem method.

Training pupils in problem-solving. Problem-solving is an important activity in every phase of living, and the ability to deal with new and perplexing situations is an extremely important element in one's equipment for practical efficiency in life. As suggested in a previous paragraph, practically every waking moment is spent in solving the varied and numerous problems of all phases of human existence. Skill in this activity is extremely important, much practice in acquiring it should be furnished in school, and young people should be trained in the more effective methods of problem-solving thinking. Recognition of "training to think" as an objective of school work has become quite general in recent years, because we have come to realize how highly

essential it is that our pupils in school be trained to do that accurate and sustained thinking which is more and more being called for in life.

Not only must boys and girls be trained in the classroom in the processes of reflective thinking and problem-solving, but they must be habituated to do the thinking for themselves. They need, too, to develop personal initiative and self-confidence, as well as skill in thinking. The dogmatic and authoritative content and methods of our traditional school work tends too much to crowd out opportunity for original thinking and the development of initiative.

2. Opportunities for problem teaching

Organizing courses on the problem basis. The use of problems in teaching is not restricted to any set or formal method, or to any one teaching plan. The essence of the "problem method," as may be implied from the foregoing section, is the putting of the student into a problematic attitude toward his school work; causing him to experience dissatisfaction or desire which can be satisfied only by the solution of problems which entail effort and thinking which will be educative; and the so shaping of his problem-solving school work as to cause him to acquire information, attitudes, habits, skills, or ideals which are desirable. Different teachers are attempting to attain this situation by different procedures.

A series of problems is set by the teaching, and the students attack each of the problems in turn. The goals and standards are set by the problems. Materials assisting in the solution of them are to be obtained anywhere they may be found. A large variety of reference books and materials are placed at the disposal of the pupils, and usually they are given some initial training in the use of them. The class period may be spent variously, as in the

reading of the references, in class discussions of a non-recitation nature, in individual and group laboratory experiments, or otherwise. At the close of each problem the solutions are summarized. Pupil reports, teacher lectures, and demonstrations and other visual material are employed for this purpose. The notable feature of classes taught by the problem or project method is the objective attitude of the students, motivated by the problematic situations created and the skill exercised by the instructor in stimulating, feeding, and maintaining a state of intriguing perplexity and doubt.

An example in problem-solving teaching. An example of a very successful experiment in organizing a course in American history on the basis of a series of problems may be found in one that was carried on with a class in the second year of a senior high school. Unfortunately it is not possible for the writer to give here a complete and an authentic list of the problems pursued. Those that occur, upon reflection, were:

1. How did this country come to be discovered?
2. What is the story of rival explorations?
3. How did the English come to possess Canada and the colonies?
4. How did the United States come to be an independent nation?
5. How did the United States get all its additional territory and possessions?
6. How were the colonies settled?
7. How did the people live?
8. How were the colonies governed before they became independent of England?
9. What is the story of the tariff?
10. What is the story of the political parties in this country?
11. What is the story of States rights *vs.* Federal control?
12. How has industrial and commercial life changed since 1700?
13. What difficulties have we had with foreign nations since we became a nation, and how were they settled?
14. What is the history of our present Constitution?

It is quite possible that there were other problems, and it is very probable that a number of the problems were stated somewhat differently. However, the list just given is thoroughly illustrative.

Many objections have been offered to such a procedure. Some declare that all chronological continuity is lost; some that the problems overlap and would result in repetition; and others that youngsters would get lost in the textbook. The proof of the pudding, though, is in the eating. In the case cited the pupils seemed to develop rather adequate appreciation of time relations, and the repetition proved excellent for orientation and review. This type of review was markedly superior to the usual catechism and memory review. The young people not only did not become confused in the use of the text and reference books, but, on the other hand, they developed an attitude toward the use of books as tools and skill in their use which was gratifying to see. The concern which the members of the class exhibited toward the finding of materials which contributed toward the solution of the problem at hand, and the difference in the manner in which they contributed to the occasional class discussion as compared with the customary recitation, was also a pleasure to witness.

Future development of the idea. Perhaps there is nothing new in problem-teaching, as applied to the organization of courses. Authors and speakers on educational topics have for a long time advocated the psychological arrangement of material, wherever such differed from the logical arrangement. It seems quite certain that no arrangement could be more psychological than the problem arrangement. It is the natural and lifelike method of thinking and of discovering facts. It conforms to normal thinking procedures, and appeals to effort and to interest much more effectively than does the formal and logical order of mastering content.

It may be some time before teachers generally will organize their courses into a series of engaging problems. It may never come to pass. To do so requires real teaching skill. The very idea is repellent, too, to the learned scholar with a logical mind, who immediately, after having acquired his store of knowledge, proceeds to organize it into logical arrangements and divisions and subdivisions. The thought that something might be left out, or given inadequate or undue emphasis, as might of course easily happen where the pursuit of problems replaces logically organized courses, is not acceptable to those who understand subject-matter much better than they do human nature. Another determining factor is the fact that as yet there are but few textbooks organized on a problem basis, and the American teacher, even in our high schools, tends to lean heavily upon the textbook. This condition is likely to continue until teachers' loads are lightened, until better trained workers go into teaching, and until the average professional life of the teacher is lengthened.

There is indeed a question whether textbooks organized after the problem plan are entirely feasible or satisfactory. Perhaps teachers' manuals and syllabi, never to be put into the hands of the pupils as texts, would be much more useful. The course would then still possess a certain flexibility and spontaneity which might not be true where the work is definitely laid out for the student, and the scheme of it as planned is put into his hands. In fact, one of the points of strength of problem ventures has been the enthusiasm resulting from the opportunity for informality, spontaneity, and originality.

Some subjects, as foreign languages for example, do not yield readily to problem organization, though the direct method is certainly an approximation which is founded somewhat on the same psychological considerations. And

yet, teachers of some experience should be encouraged to experiment with the idea, and eventually to transform at least some parts of their courses into a problem series.

Problems in daily assignments. While it may never be possible for every teacher to organize his courses on the problem plan, it is both possible and desirable for teachers to make much use of problems in the daily assignment. Perhaps to say daily assignment is unwise. Problems may often be pursued for several days, just as is the case when a course is organized around problems. On some days there will be several minor problems. Problems within problems, and problems within projects, is the usual experience.

In the assignment of work, whether done daily or less often, the problematic state of mind on the part of the pupil is worth striving for. When the student leaves the classroom, after having had problems raised which have aroused his intellectual curiosity and desire to know, or which have appealed to his desire to achieve, and which arise naturally in the work of the subject and stand in the way of his further progress, he is well on his way toward the preparation of the assigned work. The pupil has been challenged. A definite goal beckons. Achievement may now be measured in terms of self-established goals. The compulsion is no longer external and arbitrary, but is the natural stimulus of desire and instinctive urge.

Problems in the class hour. Some of the most effective teaching the writer has ever witnessed has been teaching that was in the nature of problem-solving. Some of the noisiest classes ever seen in action also have been classes engaged in attacking a problem raised during the class hour. The students were eager to contribute, and were so keenly interested in the discussion, and were doing such fruitful thinking, that they became hard to control. Several wished to speak at once, and occasionally did so. They sat

up straight in their seats, and with eyes agleam applied themselves almost feverishly to the task. On other occasions, their brows contracted, they wore puzzled smiles, while one or two would hold up hands, not confidently. The formal quiz over the assigned work was not employed. The deadening testing of memory was not visible, as such. Thought problems were raised which required reasoning, application, organization of the subject-matter, and correlation with previously learned material.

The teachers of these classes, no doubt, had spent some time previous to the class hour in thinking up a few puzzling questions which would at once engage the interest and efforts of the class, and stimulate them to employ the chief facts of the day's work in their discussion. Not all the questions or problems are settled in class. Some are left as a basis for assignment. Others by their very nature cannot be settled definitely. One science teacher whom the writer used to visit often started a day's class period with short demonstrations which were "puzzlers." The solution of the problems raised through these "puzzlers" often led to other problems — in the hands of a skillful teacher this will often be the case — the total of which covered the essentials of the work for the day.

Even in telling or lecturing, it is possible for the teacher to keep the class in the problematic state of mind. There are teachers who are able, by the skillful raising of questions, to maintain an attitude of question and curiosity on the part of the hearers which goes far to insure that what is being said will be listened to with interest and attention.

3. Technique in problem-solving

Types of procedure in problem-solving. When one is confronted in life with a problem, one may proceed in any of several ways to overcome the obstacle and find a solution.

One may resort to chance trial and error. Ordinarily this method is least economical, and should be used only as a last resort. Its chief value is where the possibility of error is quite limited, or where the possibility of reasoning through to a solution is quite meager. Sometimes one may change the conditions of the problem so that the solution becomes simpler, or one may even turn aside from the problem and try another avenue to one's goals — one which does not raise the particular problem. The type of problem most likely to be encountered in school work, though, is not to be dealt with by these methods.

Barring the possibility of avoiding the problem by choosing another avenue in which the particular problem is not encountered, and barring also the chance trial-and-error method, there are two general types of procedure to be used in solving a problem. Which of these two is used depends upon the nature of the problem. If it be a specific difficulty which calls for the application of general laws, definitions, rules, or some form or combination of generalizations, the mental procedure is of the deductive type; if the problem is to determine, discover, or derive a general law, formula, definition, rule, or other generalization, or to develop a concept, the procedure is inductive.

Differences and similarities of the two procedures. Many of the earlier books on general teaching method have treated these two types of thinking as the basis for entirely different or even opposed methods of thinking, and have given the distinct impression that entirely separate teaching procedures should be employed. These have been designated as the inductive and the deductive methods. The artificiality of this tendency could not long be overlooked, and more recently attention has turned more toward the points of similarity, and less toward the points of difference between the two. Irrespective of whether the problem is essentially

of the deductive or of the inductive type, the actual practical procedure is much the same. The chief points of difference are not in the methods of procedure, but in the nature of the outcomes of the thinking — in the one case generalizations, and in the other particular facts; and in the nature of the data upon which the conclusion is based — in the one case particular facts from which the generalization is made, and in the other the generalization from which the particular fact desired is deduced.

If we regard a problem as the task which confronts us in finding a way out when our adjustment to our environment and our needs and desires are not taken care of by automatic means, such as habits or reflexes, then the task of deriving a generalization, a rule, a law, a definition, or other concept from particular instances is a problem, and the settling of the question raised and the working-out of some satisfactory explanation is indeed problem-solving. It should be pointed out, however, that not all generalizations are acquired through problem-solving procedures. They may be learned by authoritative methods — from books, from lectures or illustrative material as was pointed out in previous chapters. Too, they are not always developed in a day or several days as formal school exercises. In fact the very large part of the stock of general ideas that any individual possesses has not been arrived at through any conscious effort to gather data and form such generalizations, but has been acquired incidentally and over a long period of time. Still more, these general ideas and concepts will continue to be refined, from time to time, as more related particular instances are experienced. One could hardly say that such is a problem-solving procedure. But when a teacher and a class start out definitely to develop the generalization — a formula in physics, a rule in algebra, or a definition in grammar, they are attacking a specific problem. Their

objective now is to discover the rate of increase of the speed of a falling body; to find a rule for writing the square of the sum of two quantities; to determine what constitutes a subject, and the procedure is much more similar to than different from that of other types of problem-solving.

Getting and keeping the problem in mind. Before any effort is expended in the attack of a problem, it is economy to be certain that the problem is clearly envisaged. It is the nature of young people to rush into the attack of a problem without knowing just exactly what their objectives are. Much time in making assignments — much more than is commonly taken — may be spent with profit in clearly defining and visualizing the problem or problems. Not only is it necessary to insure that the problem be clearly understood by the pupils, but also that it be kept in mind throughout the effort at solution, and that the efforts made at its solution be gauged by it.

Training in this step is valuable for its own sake, and important as a preparation for the thinking of life. Adults quite commonly lose sight of their objectives, or conceive them but vaguely in their problem-solving. As evidence of this, witness the usual digression in committee meetings and meetings of all deliberative bodies; witness the readiness with which adults come to substitute the forms and non-essential materials for the real and the essential in moral, ethical, and religious matters; witness the ease with which adults are led by politicians and public speakers, at election time, to forget original problems and to concentrate their attention upon other issues.

Data in inductive procedure. The next step is that of searching for data which is likely to assist in the solution of the problem. If the problem be the determining of a law, principle, rule, or definition, a sufficient number of representative instances, from which it may be hoped to infer

a generalization, must be obtained and examined. How many cases are necessary depends upon circumstances. Generalizations as to some things, such as the number of limbs possessed by an insect, may be drawn from the dissection of one carcass or the examination of one specimen. One contact with a human being may serve to give us an accurate opinion as to his or her culture, nationality, and religion, or as to the general features of the people of his or her race. Generally, however, more than one case is required upon which to base a safe generalization. Failure to appreciate this fact often results in much error in thinking. Forming generalizations from an insufficient number of cases is a very popular way of jumping at conclusions.

The number of cases necessary depends somewhat upon how representative the cases are, and how representative given cases are, varies with the problem. If I wish to know how well ninth-grade students of English should do on a given test, I need to have test results from a number of schools and in various parts of the country, and from schools of a variety of types — large and small, in wealthy districts and poor, and so on. Test results from a thousand cases so distributed would furnish a much better basis for generalization than results from twice or even ten times that number of pupils from one school, or from a number of quite similar schools.

The colonial policy of the English should not be determined from a study of one colony or possession only. In the study of literature an author should not be judged by one selection, unless it is known to be representative and typical. Just how many cases are necessary to teach a class inductively that “the square of a binomial is equal to the square of the first, plus the square of the second, plus or minus (depending upon the agreement of signs of the terms of the binomial) twice the product of the first and the sec-

ond terms" depends upon the readiness with which they note the essential common elements of procedure in multiplication of such cases, as:

$$(r + s) (r + s) = r^2 + 2rs + s^2$$

$$(x + 3) (x + 3) = x^2 + 6x + 9$$

$$(l + m) (l + m) = l^2 + 2lm + m^2$$

One case might suffice. It should be borne in mind that it is not necessary to present formally all the data from which generalizations will be drawn. Much of such data may be called up from the previous experiences of the pupils to serve in the solution of the present problem.

Data in deductive procedure. Where the situation demands the solution of a specific problem, rather than the development of a general idea, the data required is of a different sort. What is now needed is to determine what facts, usually generalizations, will lead to the solution of the difficulty. In algebra, the pupil often needs to determine what rule applies to the problem at hand. In Latin it is often necessary to decide what rule governs the case of a particular noun. The history class needs to decide why the North opposed the admission of Missouri to the Union. The student of science faces the question of why steel rails are not laid flush, end to end. The English student must determine whether it is "between you and me" or "between you and I." The solutions of these and the hundreds of similar problematic situations which constitute the bulk of school work necessitate a search for pertinent data, rules which will apply, for generalizations which will explain, for information which will throw light on the problem.

The task of the teacher in this type of problem-solving, once the problem with its conditions is clearly in mind, is to stimulate the individuals of the class to canvass for suggestions. This may be done by well-chosen hints and sugges-

tions, which will serve as clues. It may be done by citing references or other sources from which suggestions may be gotten. It may be done by directing the discussion along lines which will likely stimulate the pupil to think of pertinent data. The teacher should encourage and assist the students to analyze the situations, and should stimulate the formulation of definite hypotheses and the recall of general ideas from which solutions may possibly be inferred. The teacher should encourage the pupil to analyze the problematical situation into what the exact problem is, and what the given conditions are; that is, what is to be proven and what is given. He should lead the pupil to think of possible suggestions and solutions.

How much suggestion and help should be given depends upon the pupil — his age, ability, how far along he is in the subject-matter, and the amount of time that may be spent in trying to recall or find data which might lead to a solution. The best criterion is this: give just as much help, and no more, as will enable the student, with reasonable effort on his part, to arrive at the solution in the time that is allotted for it.

Generalization in the inductive procedure. Where laws, rules, principles, or definitions are being developed, the instructor must so manipulate the procedure that the essentials of the rule, or whatever type of generalization may be under way, will be sufficiently prominent that the pupil will not fail to take note of them. The school as an institution should expedite and speed up the natural and incidental accumulation of knowledge, habits, skills, ideals, and attitudes. The natural and incidental method is too long-drawn-out and too complicated for the school to follow. The teacher should simplify the situation in the classroom so that economy of time and effort is effected, and yet the situation must not be so simple that all opportunity for the student to extend and apply himself is removed.

If it is desired to develop a rule for plurals in a foreign language, a rule for the factors of the sum of two cubes, an idea of the people of a foreign country or the humor of a certain author, the data which would lead to these general conclusions must be brought to the attention of the pupil, and so organized as to permit him to abstract the essentials bearing upon the problem at hand.

The teacher must encourage the pupil to maintain an attitude of open-mindedness and suspended judgment and to note carefully possible hypotheses, but to continue to seek and examine data, ready to modify or discard the hypothesis in favor of another in the light of more complete data. One must constantly be on one's guard against the temptation to generalize too quickly and too definitely.

Quite often the final generalization resulting after continued study is full of refinements and exceptions, as compared with the original conclusion. For example, one concludes at first that the Greeks were a highly intellectual people. One learns upon more careful study and from more data that there were some lines of learning in which the Greeks were quite untutored, and also that only certain classes of the Greeks were as well informed as the average high school graduate of to-day. One also learns that these classes of the Greek people were quite productive, and contributed much to the world's learning in certain lines — architecture, sculpture, geometry, and literature — while they contributed but little in others. The hasty opinions that young people form regarding certain authors, or their writings, similarly may often be revised or entirely replaced after more contact with the authors or literature in question.

It is unfortunate but true that in the social sciences, such as economics and sociology, and in psychology as well, there are relatively few well-defined laws or rules that may be

learned. Yet there are countless generalizations, tendencies, near-laws, definitions, and concepts which are very valuable to those who acquire them. These may not be mastered in a few short lessons. Because of their subtle and shadowy nature they are acquired only after much careful thought and study of the data of these subjects. They are replete, too, with exceptions and modifications.

The student must be taught to be observant but patient, to withhold final judgment, and to form tentative generalizations but to regard them only as tentative. This is one of the most valuable of services which teachers can render to young people, not only because of the bearing upon the pupils' progress in their school subjects, but because of the value of such training in all the affairs of life — in the home, in business, on the street, at the polls, and almost everywhere. This ability or attitude largely represents the difference between people who seem to be always "lucky" enough to make no "bad breaks" and seldom to "lose their heads," and those who decide too quickly and speak their opinions too readily; the difference between people unfortunate in business and with their friends, and those who are regarded as long-headed and whose judgment is respected and who keep friends well; the difference between people who are the dupes of political demagogues and party leaders and the independents who think for themselves.

Inferring in the deductive procedure. Much that has been said in the foregoing paragraphs regarding the formation of generalizations and the service that the teacher may render may be applied with the same force to the formation of conclusions, usually referred to as "inferences" in the deductive procedure. The attitude of suspended judgment, and the habit of critically examining and testing all suggested conclusions are just as essential, and the service that may be rendered in promoting these phases of thinking

procedure in the class is just as valuable, both for the work of the class period and for the future.

Checking and verifying conclusions. In both types of problem-solving it is necessary to check up or verify each conclusion. The conclusion, whether a law, rule, or other generalization arrived at after the inductive procedure, or an inference arrived at after the deductive procedure, may be checked in two ways:

1. It may be checked by the examination of further data and more cases as in the inductive procedure, or more hypotheses as in the deductive process.
2. It may be verified by assuming it to be correct, and comparing the logical necessary consequences of the conclusion with what is known to be actually true.

The true scientist never closes his mind on any point. He is always willing to consider more cases and to compare any of his generalizations with known facts.

The late Samuel Chester Parker furnished us with a very apt illustration of how each of these methods of verification might be used in testing out the generalization that heredity is not an important factor in determining individual traits in human beings. He employed as illustration a debate in which the question under discussion was the relative influence of environment and heredity.

Both methods mentioned above could be employed to verify the fact of the importance and influence of the factor of inheritance. One person may make the statement that he believes heredity is not an important factor, because he knows of a particular case in which a son's traits could not be derived from his parents. Verification in this particular case might involve getting further evidence about it — further family history which might show, for example, that the son was like his grandfather, and thus establish the fact of heredity.

The other method of verification might start from the following statement: "If heredity or original nature is a very powerful factor, we may infer that similar children who are brought up under identical circumstances ought to remain similar, and different (dissimilar) children who are brought up under identical circumstances ought to remain different (dissimilar)." The verification would consist in finding cases and noting the actual results, as Sir Francis Galton did in England in the case of similar twins brought up under different circumstances, and dissimilar twins brought up under similar circumstances. The evidence was strongly in favor of the influence of heredity; that is, the similar twins brought up differently remained similar, and the dissimilar twins brought up with similar training remained dissimilar.

Formulation of conclusions. It is probably well to insist that the conclusions to all the important problems raised be put into statements which are somewhat concise and accurate. This procedure will serve the double purpose of increasing the probability of clear understanding and agreement by the pupils, and of assisting accurate retention by making it possible to commit the conclusions to memory in some exact form.

However, as regards definitions or solutions to deductive problems, it should be borne in mind that the formulation of conclusions in exact words is inconsequential to the complete understanding of the definition or conclusion. While exact formulation may add something, especially in the case of scientific definitions, formulation and memorization without true assimilation are wasteful and valueless.

Summary of processes in problem-solving. A summary of the more important processes in problem-solving are given below:

INDUCTIVE

(Development of generalizations, as concepts, rules, principles from examples, etc.)

1. Getting and keeping the problem and its conditions clearly in mind.
2. Recalling, locating, and examining instances or cases.
3. Tentative formulation of possible generalizations.
4. Critical evaluation of tentative generalizations.
5. Formulation of generalization.
6. Check or verification of conclusions.

DEDUCTIVE

(Solution of perplexing difficulties by inferring from previously developed facts, as causes, effects, consequences, etc.)

1. Getting and keeping the problem and its conditions clearly in mind.
2. Recalling known facts which may serve as a hypothesis.
3. Tentative formulation of possible inferences.
4. Critical evaluation of tentative hypotheses.
5. Formulation of inference.
6. Check or verification of conclusions.

Function of the teacher in the problem-solving exercise.
The teacher must facilitate the steps in problem-solving with considerable skill if student effort is to be economical, and if effectiveness in problem-solving is to be gained. Important opportunities for service may be seen in the following:

1. Assisting the pupil or class to encounter suitable and worthy problems.
2. Assisting the pupil or class to formulate problems clearly, and in such a way as to be of suitable difficulty and of proper educational value.
3. Assisting pupils to keep problems and conditions of problem in mind, and preventing digression.
4. Assisting pupils to find or recall data which will contribute to the solution of the problem, and offering hints, suggestions, and references, but being careful to be of no more assistance than is necessary, and thereby not depriving the pupil of any educational opportunity.

5. Training pupils to evaluate carefully for themselves each suggested conclusion, and to maintain an attitude of suspended final judgment.
6. Training pupils to be systematic in the consideration of hypotheses and their evaluation, to follow some order, and to complete the consideration of one before digressing to another.
7. Assisting pupils to formulate their conclusions for themselves.
8. Training pupils to make final check and verification.
9. Providing for the fixing of solutions in mind by drill, application, memory work, or exercises.

An extension of the problem-solving idea brings us naturally to the study of project teaching, to which we next turn.

QUESTIONS AND EXERCISES

1. Review and get in mind the relative advantages and disadvantages of the authoritative and developmental methods.
2. Formulate three problems for your subject, around which the work of a class might center for several days or more.
3. Formulate a deductive and an inductive problem in your subject, and show what procedure would fall into each of the steps involved in the solution of each problem.
4. Suggest a list of from six to eight cautions or dangers in the technique of employing a problem-solving type of teaching.
5. What are the advantages of emphasizing a problem-solving type of teaching?
6. Write out an assignment for some high school subject which is composed of several problems.
7. What ways are there of learning generalizations, other than by deriving them as problems? What are the relative advantages and disadvantages of the problem-solving method of learning generalizations?
8. What are some of the types of mistakes made by people in everyday thinking? Can students in school be trained to avoid these errors?
9. Criticize the following statement of the inductive process by steps: 1. Preparation. 2. Presentation. 3. Comparison. 4. Generalization. 5. Verification or application. What misinterpretation may result from such a statement of the process?

SELECTED REFERENCES

- Averill, L. A. *Elements of Educational Psychology*. Boston: Houghton Mifflin Co., 1924.
Pp. 213-29. Psychology of problem-solving.

Branom, M. E. *The Project Method in Education*. Boston: R. G. Badger, 1919. 312 pp.

A detailed discussion of problem and project methods containing special reference to history and geography.

Clark, A. Bess. "Another Experiment in Problem Teaching"; in *English Journal*, vol. 8, pp. 218-24. (April, 1919.)

The use and effectiveness of the problem method in handling third year high school English work.

Dewey, John. *How We Think*. D. C. Heath & Co., 1910. 224 pp.

Somewhat laborious discussion, but for years the great standard exposition of the thinking process.

Foster, Herbert H. *Principles of Teaching Secondary Education*. New York: Charles Scribner's Sons, 1921.

Chapter VIII, "The Problematic Mode."

Freeland, George E. *Modern Elementary School Practice*. New York: The Macmillan Co., 1919.

Chapter II, "The Problem Method." Values and illustrations from school subjects.

Gates, Arthur I. *Psychology for Students of Education*. New York: The Macmillan Co., 1924.

Chapter XIV, "Reasoning and Problem-Solving."

Levin, S. M. "The Use of the Problem Method in History Teaching"; in *Education*, vol. 40, pp. 111-20. (October, 1919.)

Lull, Herbert G. "Problem-Project Instruction"; in *School and Home Education*, vol. 38, pp. 79-83. (December, 1918.)

Relation of recitation to study-pupil activities in the recitation, teacher activities in the classroom.

Miller, H. L. *Directing Study*. New York: Charles Scribner's Sons, 1922.

Chapter V, "Development of True Work Spirit." Also other sections are related, e.g., pp. 23, 140-42, 150, 164-67, 206-08, 230-77, 349-50, 353, 371.

Parker, S. C. "Problem-Solving or Practice in Thinking"; in *Elementary School Journal*, vol. 21, pp. 16-25, 98-111, 174-88, 257-72. (September, October, November, December, 1920.)

The first article furnishes illustrative school subject "problems," and the last article outlines and discusses the steps of procedure in problem-solving.

Parker, S. C. *Types of Elementary Teaching and Learning*. Boston: Ginn & Co., 1923.

Chapter X, "Problem-Solving, or Practice in Thinking." Discussion concerning rules for and schoolroom examples of reflective problem-solving.

Parker, S. C. *Methods of Teaching in High Schools*. Boston: Ginn & Co., 1915.

Pp. 169-203, problem-solving. Excellent discussions of technique of problem-solving with special treatment of functions of teachers.

Stormzand, M. J. *Progressive Methods of Teaching*. Boston: Houghton Mifflin Co., 1924. Pp. 164-70.

Technique of problem-solving, and relation to projects.

Tryon, Rolla M. *The Teaching of History*. Boston: Ginn & Co., 1921.
Chapter IV, "Special Methods of Procedure." Topical, "Source and Problem."

Weisend, W. F. "The Problem Method Applied to History"; in *Education*, vol. 40, pp. 601-05. (June, 1920.)

Wilson, H. B. "The Problem Attack in Teaching"; in *Elementary School Journal*, vol. 17, pp. 749-55. (June, 1917.)

Of especial interest to history teachers.

CHAPTER XI

PROJECT TEACHING

1. *What project teaching is:* Problems and projects — Origin of the term in teaching — Definition of project teaching — Projects, problems, and common sense.
2. *The psychology of the project and its values:* Problems, projects, and interest — Problems, projects, and the law of intensity — Problems, projects, and the transfer of training — The problem-project and the teacher-pupil relations — The problem-project and training for initiative and individuality.
3. *Types and examples of projects:* Physical and material projects — Learning projects — The intellectual project or problem — Group projects or individual projects — Projects in various high school subjects.
4. *Dangers, limitations, and objections to the project method:* Five types of objections — Projects and the organization of subject-matter — Projects and non-educational activity — The difficulty of discovering projects — The necessity for drill and other non-project types of teaching — Evaluation of dangers and objections.
5. *Technique of the problem-project method:* Special limitations in the high school — The selection of projects — Pupil planning — The execution of projects — Culmination and judgment of projects — The problem-project and other socialized procedures — Problems, projects, "challenges," "life-topics," and "contracts" — The problem, the project, and the course of study — Summary of the problem-project method.

Questions and exercises — Selected references.

1. *What project teaching is*

Problems and projects. When the solutions of problems such as we have just been discussing take on certain aspects, they become projects. Just when a problem becomes a project it is hard to say. In the completion of projects there are usually encountered several problems, arising at various points in the procedure. Stormzand, in a recent book, suggests that as long as a problem is solved on a strictly

mental plane, or on a symbolic plane, it is yet but a problem, and that it becomes a project only when it is solved "in the realm of the real, the material, the physical, the practical." Thinking out how to lay out a garden is to this way of thinking but a problem, even though the plans be symbolized by drawings. When the garden is actually planted it becomes a project.

This distinction may not be commonly accepted, but it is serviceable in that it shows the very close resemblance of problems and projects. The project is but a problem carried to actual, practical completion. The rub comes in the words "material," and "physical." There are those who believe that problems may be carried to practical completion on an intellectual plane — intellectual projects. The underlying principles of procedure for problems and projects are essentially the same. Problems and projects possess very much the same values, and the merits of them as teaching procedures are based on the same psychological facts. It is not necessary, or desirable even if possible, to attempt here to draw a sharp distinction between the two.

Origin of the term in teaching. The use of the term "project" in teaching arose in the teaching of manual training, household arts, and vocational activities. Whenever some unit of real material problem-solving as carried on in adult out-of-school life was employed as a unit of activity, the unit was called a project. The baking of a cake, the making of a gate, the construction of a piece of furniture, and the care and marketing of a crop or live stock are examples of projects. Activities of this sort are of such a nature that they may be carried on to educational advantage in the science laboratory. Consequently it was but a short time until possibilities for projects were found in each field of subject-matter taught in the elementary and secondary schools, and as the points of superiority of project teach-

ing as opposed to arbitrary teaching methods came to be recognized in the vocational and manual subjects and in science, many teachers attempted to employ the project idea more widely in the teaching of other subjects, as English, history, mathematics, and foreign languages.

Real life-situations could not be duplicated, and classroom activities culminating in material products could not be devised with similar ease in these latter subjects. As a result, many unit-activities were devised which, while still partaking of the nature of problem-solving, are nevertheless characterized by many of the superior points of real projects, yet are not completely "real or practical or physical." They have to be solved on intellectual or symbolical planes. Whether these be problems or projects these units have certain very worth-while pedagogical points of excellence.

Definition of project teaching. The project as used in teaching is a unit of activity carried on by the learner in a natural and lifelike manner, and in a spirit of purpose to accomplish a definite, attractive, and seemingly attainable goal. In the project the learner participates in the planning and direction of his own activities toward the accomplishment of the goal, and for that reason experiences a feeling of ownership and responsibility for the success of the activity. Activities partaking most completely of the project idea are those the success of which may be objectively judged, and progress in which is apparent to the learner.

Upon examination the project as just defined possesses the following characteristics:

1. The activity is a unit.
2. The activity is carried on in a natural and lifelike manner, independent of logical divisions of subject-matter, free from academic artificiality and formality, and in a natural setting.
3. The learner approaches the task in an attitude of purposefulness; it is a self-imposed task, rather than one imposed arbitrarily by the teacher or the course of study.

4. The activity is aimed at definite, attractive, and seemingly attainable goals. The activities of the learner grow out of the purpose or goal.
5. The learner marshals his own activities and plans and directs them, assuming responsibility for his efforts and the success of his activity.
6. The nature of the activity is such that the degree of success it attains is apparent in an objective way to the learner, and is not dependent upon the judgment of the instructor.

Projects, problems, and common sense. Teachers are inclined to waste much valuable time in quibbling over what technically constitutes a project and what does not. An activity may technically constitute a project and yet be a very inferior educational activity. Merely being a project does not necessarily carry with it merit. A good problem, yes, even a good, old-fashioned, arbitrary, autocratic, daily assignment and recitation, is a much better teaching procedure than a poorly managed project. Not much good can result from merely learning the definition of a project. What is important for teachers is to appreciate the psychological and pedagogical principles which lie behind the project, and which account for its merit and effectiveness.

The extent to which any teaching or learning activity is based upon sound principles, granting that they involve learning which contributes to the aims of instruction, is the important consideration. Activities may partake of the nature of a project in some respects and not in others, and for very practical and important reasons. There are varying degrees of "projectness" which it is possible or desirable to employ. Teachers should spend little time in settling the question of whether what they propose to do constitutes a project, or a problem, or neither. The point to be kept in mind is the degree to which the activity involves the sensible applications of sound educational principles.

2. The psychology of the project and its values

Problems, projects, and interest. Colvin once said that one of the outstanding characteristics of the American high school pupil was the lack of any impelling motive to work. The classroom activities of the typical high school student appear anything but purposeful or absorbing. The students too often evince little or no interest in the intellectual work of the school. One of the significant features and values of the problem and project method is that, where successfully managed, the attitude of the student usually changes to one of interest and application, and one of responsibility for the work.

This change is not difficult to account for. One important contributing cause is the very definiteness of the goal intrigues and challenges. The value of definiteness in assignment was noted in a previous chapter. The project is a good example of a definite assignment — one self-assigned. A second reason for the increased interest and effort is the fact that the purpose is the student's own. He does not approach the task under duress or compulsion, with the accompanying unfavorable attitudes of one coerced, or the mechanical perfunctoriness of one grown accustomed to habitual obedience. This phenomenon may be attributed to the operation of the law of readiness. Activity is not pleasurable and interesting entirely on its own account. What is pleasurable at one time or under certain circumstances may not be so at another time or under other circumstances. Whether given subject-matter will be interesting depends upon subjective factors, as well as on the nature of the subject-matter itself. Among these subjective factors is what is called "mind-set" — purpose or direction of mind. Experience which fits in with the individual's set or purpose and furthers it gives satisfaction, and is eagerly watched for and seized upon. Experience which does not fit in or

contribute to one's present purposes is avoided, unless it is intrinsically very interesting, or unless it fits in with strong purposes, and if forced upon one is an unwelcomed distraction, and annoys. When one searches the encyclopædia, the newspaper, or the textbook for information which will assist in the settling of some doubt or problem, one casts aside all but that which is pertinent to the solution, and it is in this particular situation a "satisfier" and a welcome experience. So it is that the "purposing" of a given project furnishes a mind-set which transforms books or activities which ordinarily may give annoyance into objects giving real satisfaction.

Another source of the interest-provoking power of project work is the fact that it engages some of the most powerful natural drives of human conduct — the craving for achievement, the desire for self-expression and self-direction, the desire for manipulation and construction, the desire to know and to settle states of doubt and uncertainty, the so-called instinct of curiosity, and the desire for approval of one's achievement. The way to harness human energy is through these drives, which select for individuals what activities they will be engaged in.

It is the force of such drives, rather than the impelling power of fear, compulsion, or coercion, or the necessity for food or clothing or the desire for wealth, that lies behind the big work of the world. No amount of coercion or compulsion from without could motivate the achievements of an Edison, a Woodrow Wilson, a Harriman, a poet, a business genius, or a great actor. The desire to achieve and the desire for approval of a right sort must be the power behind the efforts of such men. Compulsion and coercion may serve to motivate the work of day laborers, business clerks, or skilled labor of a low order; but intellectual achievement of a high order, even on the part of the high school student,

must be born of different stuff. The very presence of coercion, compulsion, or bribery makes it impossible.

A third factor making for a high degree of interest and application is the opportunity for the planning and directing of the activity by the student. It is only natural that each of us takes more interest in our own undertakings than in those in which we are but privates in the ranks. The learner has the spirit of the *entrepreneur*. The change from an uninterested perfunctory learner of lessons to an interested and animated worker, which so frequently takes place when the project method is initiated, is similar to the change which takes place in the farm-hand when he becomes the farm-owner. It is the interest taken in "my" farm or "my" project. Parents have realized that this is an important human characteristic, and have adjusted themselves to it by setting up situations in which the son or the daughter assumes responsibility for undertakings and looks forward to the natural rewards of the enterprise as an incentive, by giving them hogs to raise, a field to cultivate, or a share in some going project. The principle may be seen in student government, where students, placed in a position of responsibility for certain school enterprises, rise to the occasion and in committees assume active interest in affairs in which previously they had little or no concern.

A fourth source of interest in project teaching is the opportunity offered to see definite, tangible progress toward a goal which has assumed importance in the eyes of the learner. The fact that the progress may be readily and objectively noted serves to generate enthusiasms, as well as to prevent discouragements or dissatisfaction with tasks in themselves unpleasurable. Added to this is the fact that there is always the prospect of a consummation of the objectives set.

Still another cause for superior interest in the project is

the realization on the part of the learner that the activity is real and like life — like those of men and women, and for that reason has significance — and that it is not merely an artificial classroom exercise. The tendency and desire to be of the out-of-school and adult world is appealed to. The pupil's appreciation of the importance of what he is doing is enhanced by the fact that the activity is carried on in a natural or lifelike setting.

Perhaps continued effort on the part of the learner is stimulated by the realization that the responsibility is definite — that is, if he fails in the undertaking the failure will be obvious and individual. The learner cannot, as in the recitation, find safety in numbers and obscurity.

It seems safe then to say that, given otherwise reasonably favorable circumstances, suitable projects once assumed by an individual or a group will stimulate interest and effort much in excess of what is now commonly displayed by our high school pupils.

Problems, projects, and the law of intensity. Because of the definite purpose and increased interest, the learner is in a much more favorable condition for learning, and much more intense states of mind accompany the learning activity. The eagerness with which the student attacks the problem minimizes the effects of distractions, makes for vividness, reduces the amount of repetition necessary for learning, and contributes to its permanence. While as yet no quantitative experimental data may be cited, it seems quite safe to say that students remember the content learned in the completion of projects or the solving of problems longer than similar material learned under less favorable conditions of interest, purpose, and attention.

Problems, projects, and the transfer of training. One disadvantage of the highly artificial organization of subject-matter in conventional teaching is the lessened opportunity

for training in application. In life problems do not call for solutions by chapters. In their solution we run crosswise the logical divisions of subject-matter, emphasizing whatever is needed from any or all fields. The problem-project method, likewise, tends to organize subject-matter around problems similar to the manner in which it would be employed in out-of-school life, and by so doing assists in bridging the gap between knowledge and its practical uses.

Training in the technique of searching, evaluating, and organizing subject-matter for the purposes of problems and projects is excellent, and is practical training for life. The natural setting of the project tends to lessen the gap involved in the application of subject-matter learned to the problems of the out-of-school world.

The problem-project and the teacher-pupil relations. The problem-project method usually leads naturally to socialized class activity and supervised study, and a very different and improved teacher-pupil relation is possible as a result. In problem-project work the pupil sets his own tasks; they are not teacher-imposed. As in any other form of supervised study, the teacher acts as a guide, counselor, and helper. The teacher and pupil may even work shoulder to shoulder, and the old challenge between teacher and pupil may be eliminated. The tasks may easily be made objective, impersonal things. Because these things are possible the influence of teacher-suggestion may be increased. Avenues to the pupil's heart and will, hitherto largely closed, may now be opened to the teacher, and the concomitant responses may be of an entirely new sort. Instead of arousing resentment, rebellion, or perfunctory compliance, there is engendered coöperativeness, confidence, and interest.

The problem-project and training for initiative and individuality. Under the traditional type of class procedure, assignments are more or less uniform and restrictive. The

job is laid out, either by direction or implication, for the student. There is no choice or opportunity for originality or initiative. The charge sometimes made against the schools that they destroy and choke initiative and individuality is not without basis. A more or less standard response is encouraged, if not required.

The problem-project method obviously is training for initiative and individuality. Each step permits of self-expression. In the formulation of the project there is opportunity for initiative and individuality, as there is throughout the planning of the procedure and in the execution of it.

Habits of initiative are inculcated. Because of the increased responsibility placed and chance for initiative opened, students soon learn to rely upon their own resources. They come to expect to direct their own efforts, and the deplorable tendency to wait constantly upon the instructor is not formed.

3. Types and examples of projects

Physical and material projects. The type of project which meets most clearly the requirements of definitions of projects is that in which the purpose is to express some idea or plan in material or physical form. Examples of this type are:

- Making a footstool.
- Planting a garden.
- Operating a school bank.
- Setting up a radio set.
- Writing a short story.
- Making a scrap book.
- Making a fire extinguisher.
- Presenting a play in a foreign-language class.

These represent the simpler and the more common types of school project work.

Learning projects. The learning type of project is not unlike a great many study activities now carried on without reference to the idea of project teaching. The resolve to learn how to write a new story, if carried through to completion by the initiative of the learner, is an example of this type of project. The purpose to learn to pronounce French correctly; the purpose to investigate and acquaint one's self with the nature of Greek civilization; the purpose to become well informed on the history of political parties in the United States; the purpose to master the technique of glass manipulation in the laboratory, "bunting" on the ball ground, or dancing in the gymnasium; the purpose to improve one's spelling; the purpose to complete the mastery of a unit of subject-matter in algebra or geometry by a certain time — all these purposes, when carried to completion in a natural way on the initiative of the learner, belong to this class of projects.

The intellectual project or problem. A third type of project is that in which the purpose is to settle some intellectual question by the inductive or the deductive type of problem-solving. Of this type are the following:

To ascertain why water gathers in the mouth of a milk bottle turned upside down on a draining board.

To discover what is the coefficient of expansion of copper.

To determine whether Shylock was really misjudged in the "Merchant of Venice."

To determine how the French lost their possessions in North America.

To work out a rule for squaring a binomial.

To work out a rule for deciding whether *in* in Latin should take the accusative or ablative.

To find out whether dew falls or not.

Here again we have the question of whether such purposeful activity is problem or project, and here again let us say that it does not matter, so long as the pupil approaches the

work with purpose and initiative and carries it to completion in a natural way.

Group projects or individual projects. It should be recognized that projects may be initiated, planned, and completed by individuals within the class, or by groups, or by classes. The whole class may work on a project, different groups within the class may work upon different projects, or different individuals may assume responsibility for sub-projects or contributing problems.

Projects in various high school subjects. The following is a series of brief illustrative lists of projects which have been employed in various high school subjects.

1. Projects in English.

1. Publishing a mimeographed school paper.
2. Furnishing a school section in the local newspaper.
3. A "better-speech" crusade.
4. Dramatization of the "Pied Piper."
5. Writing and staging a play, "The Sailing of the Mayflower."
6. Organizing a reading table.
7. A "Robert Louis Stevenson Program."
8. A descriptive book about Chicago.
9. "Thrift Week" and "Education Week" compositions.

2. Projects in Science.

1. A project in community health — what are the causes of typhoid fever in our community, and how can we best combat them?
2. A study of patent medicine — analysis and evaluation of a number of nostrums.
3. The creation of cosmetics — a study of contents and manufacture of certain cosmetics, with conclusions as to their effect upon the skin.
4. A study of the relation of certain foods in diet to weight.
5. How to ventilate a house.
6. The construction of a radio set.
7. A "Science Demonstration."

3. Projects in History and Civics.

1. A study of Oakland, California, with subsidiary projects;

as, early Oakland, education, transportation, nature of population, each handled by a committee.

2. The unification of Italy.
3. A history of Oregon, from original sources.
4. The early history of Brownsville.
5. Pioneer days in Lane County, Oregon — a float parade.
6. Why the United States declared war on Germany.
7. Preparing a brief to the city council for the establishment of a public swimming pool.
8. Conducting a school election.
9. How can we best Americanize foreign people in Rockford?

4. *Projects in Geography.*

1. Does the United States produce as much sugar as it needs?
2. What part has transportation played in the development of our country?
3. What proportion of the people of the world speak the various more important languages -- French, German, English, Spanish?
4. To compare the relative size of the various States and foreign countries by arranging the States in the order of their size, and discovering for each the country of nearest size, and for each the one of nearest approximate population.
5. To construct a relief map of the local district.
6. A play illustrating, costumes, products, and customs of peoples of different foreign countries.

5. *Projects in Mathematics.*

1. Making a geometry cross-word puzzle.
2. Working out a rule for squaring a binomial.
3. What is the cost of widening Church Street?
4. What will be the increase on the State property tax for my father, if the income tax is repealed?
5. Constructing a geometric design for a decorative background.
6. Representing graphically the attendance in three roll-rooms of a high school throughout the month.

6. *Projects in Foreign Languages.*

1. A coöperative book on "France; Her People, Customs, and Institutions."
2. A cross-word puzzle in French.
3. The dramatization of a one-act play.

4. The direct method is in itself a large project — the purpose to speak the foreign language
5. A correspondence in French.

4. Dangers, limitations, and objections to the project method

Five types of objections. The dangers and limitations of and the objections to the project method center around:

1. The breaking-up of the organization of subject-matter.
2. The amount of non-educative activity in the procedure.
3. The difficulty of discovering sufficient projects toward which a really purposeful attitude on the part of the students will be taken.
4. The increased teaching skill required to initiate and manage projects.
5. The necessity for drill and other types of teaching not incidental to the project employed.

We shall consider each of these objections, briefly, and in the above order.

Projects and the organization of subject-matter. Objections on this score have included the following:

1. The use of projects tends to disrupt the logical organization of subject-matter, and by so doing to prevent a complete understanding of the subject-matter as a logical whole, and to prevent the placement of the subject-matter in such a way as to provide a proper apperceptive background for new material.
2. The use of projects makes it very difficult to grade subject-matter according to its relative difficulty.
3. Because of the flexibility permitted it is difficult to hold teachers responsible for definite portions of subject-matter.
4. Much valuable subject-matter may be omitted.
5. Various portions of subject-matter will not be given the relative emphasis they should have.

There is some merit in these objections, yet much of the possible damage may be avoided by the employment of the same degree of skill in the use of the project method which instructors exhibit in the traditional teaching procedures.

The value of a complete and logical organization of subject-matter has without doubt been overestimated, and skill in selecting projects will reduce this objection to a minimum. It is not desirable to have all subject-matter of the same level of difficulty, and it is not now so arranged. It is not necessary, either, to hold teachers too closely to fixed courses of study in the high school. In very few schools is any thorough attempt made to do so, and any attempt to standardize completely the instruction in high school subjects would not meet with favor. It is not intended that the use of the project will necessitate any complete disregard of the emphasis desirable to be placed on various portions of subject-matter. In the selection and formulation of projects, and in the use of supplementary methods, proper emphasis may be safeguarded.

Projects and non-educational activity. It is claimed that too much time often is spent on phases of projects which have no proportionate educational value. Teachers have been known to permit students to spend hour after hour upon some physical aspect of a project which has added but little to its educational value. There is an inclination, too, to emphasize the material and the showy, and there is no question but that frequently this is overdone. The mere fact of assuming initiative and responsibility, regardless of the nature of the activity, does not in itself insure adequate educational dividends.

It is also objected that too much time is spent upon the machinery of the process — the discussion, selection, initiation, and planning of projects — and that teachers could spend the time so used to much better purpose in “teaching.” While without doubt some planning and discussion might advantageously be eliminated, the importance of student purposing and student planning should not be underestimated. There is considerable direct educational

value in such activity, and, were there not, the activity makes an indirect return in the way of increased student interest and responsibility.

The difficulty of discovering projects. It is not contemplated that all high school teaching should be done by projects — certainly not as yet. The method is not an easy one for a young teacher to use, and its use often is not economical, even with teachers who can handle the method well. With time not only will hundreds of possible projects be tried out, and their teaching technique be worked out, but complete courses of study in terms of projects, in certain school subjects, probably will become available. The method, though, is not one for the beginner to plunge headlong into. The ability to lead pupils to “discover” suitable projects, and to purpose to complete them, naturally requires larger teaching skill than does the making of arbitrary textbook assignments.

Like the socialized recitation, the project method is not proposed as a means for making teaching easy. It is more than likely that in the hands of immature or weak or lazy teachers it will prove a failure. It is rather a means for making learning more effective and making better teaching possible. It should be remembered, however, that the merit of project teaching cannot be fairly judged by a comparison between the success of an experiment with it, and the success ordinarily attained by the use of traditional methods. A fair evaluation of its relative worth can be made only after sufficient practice has been had with the project method to insure a degree of proficiency comparable to that attained with older and more standardized teaching methods.

The necessity for drill and other non-project types of teaching. Many teachers have feared that the use of projects in any large measure would result in the neglect or omission of the drill work essential to fix necessary infor-

mation, establish habits, or perfect necessary skills. Likewise many fear that certain types of appreciation teaching would not be provided for. A twofold answer to this objection may be made.

In the first place, the project method does not necessarily ignore or neglect these outcomes of teaching. Information in many cases is as well fixed by the use of projects as by the use of many repetitions in drill. The project approach to appreciations and interests is probably as favorable as the arbitrary approach, if not more so. Skill projects, memorizing projects, and appreciation projects are not only possible, but should be frequently employed. Projects may be so formulated and guided that their completion will involve drill for skill or for memorizing. Project teaching will often serve to develop interests and appreciations not possible under arbitrary or compulsory methods.

In the second place, it must be remembered that the use of projects does not in any way preclude the use of other methods, if such seem desirable. Perhaps the best use to make of project teaching, especially when it is still in the stage of being mastered by the teacher, is as a supplement to other and better established methods of teaching. Special drill work, or lectures, or other types of instruction should be provided for whenever the occasion seems to demand. It is expected that teachers will employ as good judgment in this respect as elsewhere in the choice of teaching procedures.

Evaluation of dangers and objections. It is not fair to take the position that, because a large share of the strength of these objections and dangers may be offset by careful management and skill on the part of the instructor, the problem method does not have its shortcomings. Like any other method of instruction it has its weaknesses and defects. It is difficult to employ the method successfully. Projects will sometimes come to naught. Students will still fail to

learn everything in the course of study. But let us remember that the older methods are also difficult to employ successfully, and that the older methods also frequently come to naught or result in somewhat unsatisfactory outcomes. Those portions of the course of study the average student fails to master by the use of traditional methods are quite considerable. The results of new or proposed methods should not be compared with ideal situations; they should be compared with results of methods now in vogue.

5. Technique of the problem-project method

The technique of problem-solving was described in the chapter just preceding. The discussion that follows accordingly will approach the question from the angle of the teacher's technique in stimulating and guiding problem-project instruction, and with particular reference to projects.

Special limitations in the high school. The true problem or project is not concerned with the boundaries or compartments of subject-matter. Data needed for the solution of a life-problem or project are drawn from every source. The opportunities for project teaching are somewhat better in the elementary school, where all or nearly all subjects are taught by one teacher, than in the junior and senior high school where departmental teaching is employed. In the elementary school a single project may be employed which will involve grammar, composition, spelling, penmanship, arithmetic, science, reading, drawing, and manual training. The elementary school teacher need not worry about giving time to subjects for which she is not responsible.

For this reason the high school teacher, who feels the responsibility for and is specially trained for a single department of knowledge, is much more limited in the choice of projects. Yet, even high school teachers should attempt to keep in mind that, after all, department or no department,

their calling is the development of young people, and that projects having values in other fields need not necessarily be excluded.

The selection of projects. As in the case with any teaching procedure, the project method in itself does not provide a complete educative situation. Merely having students purposing, planning, and executing projects may or may not be good procedure, depending upon what projects are being completed and the nature of the procedure followed. The following criteria should apply to the selection of projects:

1. The project should be such as may reasonably be expected to result in the acquisition of valuable information, skills, habits, ideals, or attitudes, and in proportion to the time required for its completion.
2. Care should be taken that the amount of non-productive machinery or activity that the project will entail, such as discussions in the steps of purposing and planning, or the labor involved in carrying the project to natural completion, is not out of proportion to the educative value of the completed result.
3. Projects should be selected so as to overlap as little as possible, except where the overlapping is consciously done for the purpose of emphasis or desired repetition.
4. Projects should be selected with the maturity of the pupils or class and their possible interests in view.
5. Care must be taken not to *impose* projects; there should be as much voluntary acceptance of projects as possible. Students should be *led* to see or accept projects, not forced to accept them.
6. On the other hand, careful guidance should be exercised to prevent students from initiating projects of little educational value. It is not intended that every notion or whim of the student should be gratified.
7. In suggesting projects the instructor should keep in mind the course of study as a guiding factor, attempting to secure representation of the major and more important things in it, and to secure some reasonable order and proportion. In chem-

istry or physics, for example, there is no reason why the projects should not grow out of and follow the line of progress of the course.

8. Care should be taken to encourage projects which involve the learning of information or skills necessary for later work in the course or subject. This requires careful thinking and planning ahead, and can be done best only by experienced teachers.

Pupil planning. It should be borne in mind that one of the chief values of the project method, or of any problem-solving exercise, is realized through the participation by the pupil in the planning of the attack. The instructor should be careful to permit, or if necessary to insist, that the pupil or the group carry as much of the burden of planning the procedure as is practicable. The tendency to make haste by definitely outlining for the pupil the work to be done and the procedure to be followed, must be guarded against. It is just this practice of over-guiding on the part of teachers that is depriving students of valuable educational opportunity in much of our present-day teaching. Even though there is much apparent waste in the procedure, it is the price to be paid for the merits of the plan. It may be compared to certain inefficiencies that result from democratic forms of government. In the long run there is a favorable balance resulting from permitting students to share in the planning and directing of their own efforts. They must eventually learn to do these things. Training in the ability and skill in doing these things is worth more than much of the content mastered in ordinary instruction.

In the case of individual projects in the high school, a good plan is to suggest certain reading to the student, related to the project he has in mind, and then have him formulate a written statement of a proposed procedure. From this reading the student may be able to define his problem or project, and to gather suggestions as to procedure. Much

teacher time is saved by having the student formulate his project in writing before discussing procedures with the instructor. These plans may be taken up in conference. Under favorable circumstances they should be read to the class for criticism and suggestions.

In the case of group projects, a coöperative exercise is necessary. Suggestions from all quarters are to be considered, evaluated, modified, rejected, or adopted. Much skill must be exercised to prevent personal discouragement or antagonism, and to keep argument within reasonable bounds. While a certain amount of clash of wits and critical thinking is an excellent exercise, the spirit of group coöperation and continued interest in the project demands harmony.

The execution of projects. The technique of supervising the execution of projects, quite naturally varies with the nature of the project and the character of the subject-matter. Certain projects will be done largely out of class and supplementary to the class work. Others, both individual or group projects, will be done in class and under the supervision of the instructor.

Under either situation, a rather close check should be kept on the progress of the project or projects, though in case of reliable and capable students the supervision should not be too close. The supervision should be such that the student is not deprived of opportunity for initiative, or that the presentation of the project, at its culmination, is not devoid of the audience situation or the element of surprise.

As in supervised study, care should be taken to prevent waste of time, and the amount of help and suggestion given should be kept at a minimum; just enough and no more than is needed to put the student on the way is the proper method of avoiding unreasonable waste. This requires a certain amount of being "hard boiled," but nothing less is as effec-

tive. On the other hand, more encouragement should be given the weaker and more timid students. References should be suggested to students at appropriate times. One of the functions of the problem-project is the incentive to search for material that will assist in the solution of the problem or the completion of the project.

It will be helpful for the instructor to keep in mind the technique of problem-solving, as suggested in the previous chapter. The pupil or group should be brought:

1. To define the problem, purpose, or undertaking clearly.
2. To keep the problem or purpose clearly in mind.
3. To recall and search for possible data, suggestions, and solutions.
4. To think through all the data and suggestions to their consequences and implications, and to consider procedures and to evaluate these critically.

Culmination and judgment of projects. Most projects should end in some definite achievement — the accomplishment of the purpose. This may take various forms. It may take the form of an exhibition of materials — the products of classes in manual or household arts, maps, charts, models, exhibits, booklets, and the like. It may take the form of reports, illustrated or otherwise, given before the class or the school assembly. Dramatic or debate projects conclude quite naturally with the presentation of the production. The logical culmination of journalistic adventures is the publication of the product.

The desirable thing about the culmination of the project is the feeling of satisfaction on the part of the learner or learners. Even after all the educational value of the project-activity has been apparently realized, some time and care should be spent in arranging a proper culmination. The law of effect encourages such a procedure. To what extent a public exhibition is necessary depends upon cir-

cumstances and the nature of the product. With many workers the mere consciousness of achievement is sufficient.

One of the marked features of the project method is that of the possibility of objective judgment of the results. This should not be limited or minimized by the teacher. The student must be encouraged to judge of the quality of his own efforts. In most instances the standard of merit will be the accomplishment of the purpose. For this reason expert teacher judgment is not so essential, and approval and disapproval by the teacher need not be used abundantly. Students should be trained to take an objective attitude toward their own achievements.

The problem-project and other socialized procedures. The idea should not be gotten that socialized procedure, supervised study, and the problem-project procedure are three separate or mutually exclusive teaching methods. In fact, problem-project teaching is a form of socialized procedure. The "socialized recitation" technique will be employed more regularly in problem-project teaching than where traditional methods are employed. It will be found advisable to permit much informal though regulated discussion, and less question-and-answer teaching. In the selection of projects and in the planning of projects a round-table discussion will be found very convenient. Much more freedom in movement may be permitted in the co-operative pursuit of problems and projects than in a study-and-recitation procedure. Problem-project teaching is in a way a form of supervised study. Especially is this true where planning for and working out projects are carried on in class. The classroom becomes a laboratory, and the instructor the supervisor or the director of the "study."

Problem-project procedures may be so managed as to provide opportunity for every pupil to work up to maximum capacity. Individual projects will vary in difficulty

and in complexity, and the responsibility of individuals in a group project may be adjusted to capacity and ability. Bright and industrious pupils may be provided for by assigning them projects in addition to the work done by the other members of the class. Because of the variation in the nature of projects, or responsibilities within projects, differences in special interest or antagonisms may be quite naturally taken care of. Complications arising from, and variations in temperament and disposition, tend to be minimized by the opportunity for choice, initiative, and expression in the selection and planning of projects.

Problems, projects, "challenges," "life-topics," and "contracts." In some respects the problem and the project are very similar to other proposed teaching units. In some high schools the students assume responsibility for units of work called "challenges." These cover several days, several weeks, or even months of work, as outlined in the course of study planned for the class. Projects and challenges in some ways resemble the contracts of the Dalton plan of individual instruction. A "contract" is a monthly unit of work in the course of study. A "life-topic" is a natural unit of activity, such as a problem, a project, or an appreciative exercise possessing unity. In all of these units of activity there is the common idea of pupil responsibility for larger units, and protest against the daily spoon-feeding of the assignment and recitation plan.

There is one outstanding point of difference between the problem, project, and life-unit on the one hand, and the challenge or contract on the other, namely, that in the problem, project, or life-unit the organization of subject-matter and activity is with respect to a natural problem, project, or purpose. The contract and challenge intend no violence to the logical courses of study, involve no correlation with other subjects, and make no special attempt

to employ subject-matter in the solution of life-problems or projects. The contract and challenge serve merely as a means for providing for individual rates of progress, and to bring the student to assume responsibility for his learning over larger units than daily assignments. The problem and the project alike tend to focus the will of the pupil on the accomplishment of some worth-while and engaging purpose, the realization of which involves the use and organization of subject-matter with respect to the need for the same.

The problem, the project, and the course of study. Some fear has been expressed by teachers and supervisors that the use of the project will work havoc with the course of study. On the other hand, others have organized the course of study of a year-subject, as United States history, chemistry, or biology, around a series of problems and projects. The value of logical organization of studies has probably been overemphasized. No one can say, as yet, that better results are obtained by one type of organization than by another. The logic, the proportion, and the order of the logical arrangement are always a delight to the scholar's eyes. That it is the most economical arrangement for learning has never been proven. Students do not apply the outcomes of learning from a logical organization in a logically organized way. From the standpoint of application no merit attaches to the logical organization. It is quite likely, in fact it seems quite certain, that subject-matter organized around natural problems is much better received by the learning mechanisms and is more ready for use in life-situations.

Summary of the problem-project method. The problem and the project method, or, as many prefer to say, the "problem-project" method, is an attempt to psychologize teaching. The chief characteristics of problem or project

teaching is the psychological organization of the school experience around problems or projects, as opposed to the older plan of a logical organization of the subject-matter. Such a procedure conforms better to the psychology of learning than do traditional logical and automatic methods, in the following respects:

1. The learning activity is purposeful and voluntary on the part of the pupil, and is therefore carried on with more vigor and whole-heartedness, and under more favorable learning conditions with respect to attention and interest.
2. Because the work is self-directed and self-initiated, the student derives more pleasure from the learning activity. Aside from the intrinsic worth of this condition, the law of effect operates to insure permanent retention from this type of learning activity.
3. The increased similarity of learning by problems and projects to life-situations, in which the knowledge will be used, lessens the loss in transfer, and greater opportunity for the development of skill in application is afforded.
4. The concomitant outcomes of problem-project teaching are more to be desired than those of traditional autocratic methods. Among these may be mentioned: a more favorable attitude toward the daily work and the teacher; an increased interest in the subject-matter; increased skill in initiative, and in directing one's own efforts; the fuller and more hygienic development of personality as the result of a program of expression, as compared with results from a plan of repression and compulsion; the acquisition of better study and work habits, due to the concentration of genuine efforts toward large definite goals; and the increased training in reasoning resulting from the substitution of problematic learning situations for memoriter methods.

There are certain general principles of problem-project teaching which are useful in many teaching situations other than in problem and project teaching. In the first place, the students should be led to suggest and to formulate the problems or projects which constitute the school work.

This procedure is not only excellent training in itself for the student, but it operates to give him a favorable attitude toward the undertakings of the class. Opportunity and training also should be provided for students, individually or in groups, to plan the procedure in the solution of problems or completion of projects. Care must be taken that, in the apparent interest of economy, this educational opportunity is not entirely removed by the teacher's paternalistic methods. During the solution of the problem or the completion of the project, the teacher's opportunity lies in the careful guidance of the pupil or group into contacts with new ideas, new information, new ways of doing things, new skills, new ways of looking at things, and new ambitions and desires which, while apparently only incidental to the work at hand, are of much educational value.

Finally, the problem or the project must be carried to some conclusion. The dangers of the tendency to abandon projects in the crises of digression, or of premature conclusions, must be avoided. The problem or goal must be kept in view; an attitude of open-mindedness and suspended judgment, that is, a hesitancy to jump at conclusions, must be acquired; and the ideal of thoroughness or completeness must be developed. As far as possible the opportunities for the pupil to be conscious of progress must be realized, and provision should be made to bring about a situation where the attainment of the goal will operate to produce the feeling of "well done."

In short, the problem-project teaching is the arousing on the part of the pupils of desires to perform tasks or to solve problems which are in themselves challenging and which have high educational value, and the guidance of the pupil into the development of himself and his powers through the exercise and expression of his ideas — a drawing-out as opposed to a forcing-in process in teaching.

QUESTIONS AND EXERCISES

1. What do you regard as the essential difference between a problem and a project?
2. Write out in your own words a definition of project teaching, noting its essential characteristics.
3. Work out in your own mind just what is involved in each of the following four pairs of aims, as discussed in J. A. Stevenson's excellent volume on project teaching:
 - a. Reasoning *vs.* memory of information.
 - b. Conduct *vs.* information for its own sake.
 - c. Natural setting *vs.* artificial setting for learning.
 - d. The priority of the problem *vs.* the priority of information (or other outcomes).
4. What evidences could you give that project teaching is based on instinctive tendencies? What instinctive tendencies?
5. Make notes for a five-minute talk on "project teaching and transfer of training," and on "project teaching and the development of initiative and individuality."
6. Are there types of projects other than the three mentioned in the chapter? Are you sure that what you have in mind are projects?
7. Write out a list of five practical projects for use in teaching your subject for the junior or senior high school, and be able to tell in detail how you would carry out one of these.
8. What do you regard as the outstanding weakness or weaknesses of project teaching?
9. Is project method anything but a form of supervised study? Anything different from socialized procedure? Why have different terms?
10. To what extent is it possible to employ project teaching in your subject?
11. Find, in some recent journal, a description of some project actually carried out by a class group. Be able to describe and criticize the procedure.
12. Do you believe "individual" or "group" projects better adapted for teaching your subject? Give reasons.
13. Write out a list of the "don'ts" for project teaching.
14. Add one more important suggestion to those mentioned for the selection of projects.
15. Write a brief paper on the relation of project teaching to supervised study.
16. Write a brief paper on the relation of project teaching to the socialized recitation.

SELECTED REFERENCES

1. General References

Branom, Mendel E. *The Project Method in Education*. Boston: R. G. Badger, 1919.

Pp. 1-170, a good, comprehensive, though somewhat verbose, treatment of the psychology, values, and technique of problems and projects. Pp. 170-239, special chapters on the project method applied to manual arts, history, and geography.

Burnham, Wm. H. *The Normal Mind*. N.Y.: Appleton & Co., 1924.

Chapter VIII, an excellent indictment of the evolution of prevailing teaching from the standpoint of mental hygiene.

Charters, W. W. "The Limitations of the Project Method"; in *Vocational Educational Magazine*, vol. 1, pp. 568-70. (April, 1923.)

Once they are recognized the energy of teachers can make the project a very powerful instrument of instruction.

Cummins, Robert A. "Supervised Study and the Project Method"; in *Journal of Educational Method*, vol. 3, pp. 105-07. (Nov. 1923.)

Relating project method to other methods of teaching.

Freland, Geo. E. *Modern Elementary School Practice*. New York: The Macmillan Co., 1919.

Chapter III, "The Project." Characteristics, uses, and values.

Herring, John P. "Criteria of the Project"; in *Teachers College Record*, vol. 22, pp. 329-33. (September, 1921.)

Concise tabulation of the criteria by which pupils may be judged.

Horn, Ernest. "Criteria for Judging the Project"; in *Educational Review*, vol. 63, pp. 93-101. (February, 1922.)

A statement of principles involved in project teaching.

Hosic, J. F. "What is the Project Method?" in *Journal of Educational Method*, vol. 2, pp. 23-28; 65-67. (September, October, 1922.)

Discusses various uses of the term and importance of philosophy of method.

Hosic, James F., and Chase, Sara E. *Brief Guide to the Project Method*. Yonkers, New York: World Book Co., 1924. 268 pp.

Part I, "The Theory of the Project Method." Theory, value, methods of project teaching, types of projects, and their technique.

Hosic, J. F. "Outline of the Problem-Project Method"; in *English Journal*, vol. 7, pp. 599-603. (November, 1918.)

Excellent short treatment of essence of project procedure.

Hotchkiss, E. A. *The Project Method in Classroom Work*. New York: Ginn & Co., 1924.

Part I, "Background." A concise summary of psychological theory underlying the project.

Hunter, Fred M. "The Project Method. What may be Accomplished in the Ordinary School and Classroom"; in *Journal of Educational Method*, vol. 2, pp. 101-11. (November, 1922.)

Gives a number of projects in detail which may be divided into three groups: individual projects, class projects, group projects.

Kilpatrick, W. H., and others. "Dangers and Difficulties of the Project Method and How to Overcome Them"; in *Teachers College Record*, vol. 22, pp. 283-321. (September, 1921.)

Kilpatrick, William H. "The Project Method"; in *Teachers College Record*, vol. 19, pp. 319-35. (September, 1918.)

Good general discussion of theory of the project.

Kilpatrick, William H. "The Project Method." New York: *Teachers College Bulletin*, 10th Series, no. 3. (October 12, 1918.)

A very scholarly and thorough exposition of project method.

Lull, H. G., and Wilson, H. B. *The Redirection of Secondary School Instruction*. J. B. Lippincott Co., 1921.

Chapter IV, "Project Problem Instruction." Definition, procedure, and wealth of examples. Good bibliography.

Richard, Albertina. "Motive in Education"; in *Pedagogical Seminar*, vol. 28, pp. 60-72. (March, 1921.)

A protest against the thwarting of the desire for self-selected activity in the education of children.

Richmond, Kenneth. *Education for Liberty*. London: W. Collins Sons & Co., 1918.

Part I, and especially Chapters I, II, V, interesting, rapid reading.

Ruch, G. M. "A Contribution to the Psychology of the Project"; in *School and Society*, vol. 11, p. 386. (March 27, 1920.)

A brief but stimulating analysis of various concepts of the project method.

Ruediger, W. C. "Project Tangentials"; in *Educational Review*, vol. 65, pp. 243-46. (April, 1923.)

A statement and discussion of several criticisms of project method.

Ruediger, W. C. "Projects and the Project Method"; in *School and Society*, vol. 14, pp. 240-43. (October 1, 1921.)

Points out that project teaching is based on educational principles and methods known for some time.

Ruediger, W. C. *Vitalized Teaching*. Boston: Houghton Mifflin Co.

Chapter III, "Enlisting the Activities of Pupils." Good summarized discussion of the project idea.

Snedden, David. "Project as a Teaching Unit"; in *School and Society*, vol. 4, pp. 419-23. (September 16, 1916.)

An attempt at analysis of the project idea.

Stevenson, J. A. *The Project Method of Teaching*. New York: The Macmillan Co., 1922.

Chapter VIII, application of project teaching in the various subjects taught in the high school and upper grades.

Stevenson, J. A. "The Project in Science Teaching"; in *School Science and Mathematics*, vol. 19, pp. 50-63. (January, 1919.)

Gives four underlying principles of project teaching, definition and limitations. Useful to teachers generally.

Stockton, James L. *Project Work in Education*. Boston: Houghton Mifflin Co., 1920. 172 pp.

Good discussion of evolution of principles underlying project method, and of relation of project work to problem of education as a whole.

Wilson, G. M. "Teaching Levels, Teaching Technique and the Project"; in *Journal of Educational Method*, vol. 2, pp. 323-29, 385. (June, 1922.)

What teaching levels to use and how and what technique to employ; essentials of project.

2. Special Subjects

English.

Clark, A. Bess. "Another Experiment in Problem Teaching"; in *English Journal*, vol. 8, pp. 218-24. (April, 1919.)

Clark, A. Bess. "An Experiment in Problem Teaching"; in *English Journal*, vol. 61, pp. 535-38. (October, 1917.)

Clark, A. B. "Projects in Oral and Written English"; in *Journal of Educational Method*, vol. 2, pp. 217-21. (January, 1923.)

Lasher, G. H. *The Project Method in English Composition*. Bulletin of Illinois Association of Teachers of English, vol. 13, pp. 1-14. (April, 1921.)

McGregor, A. Laura. *Supervised Study in English*. New York: The Macmillan Co., 1921.

Ryffel, Geo. H. "Group Projects in Upper Grade Composition"; in *Elementary School Journal*, vol. 10, pp. 337-40. (June, 1921.)

Foreign Languages.

Grinstead, W. J. "The Project Method in Beginning Latin"; in *Classical Journal*, vol. 16, pp. 388-98. (April, 1921.)

Geography.

Branom, Mendel E., and Fred K. *The Teaching of Geography*. New York: Ginn & Co., 1921. 292 pp.

Part V (pp. 165-263), "The Project or Active Method."

History, Civics, and other Social Sciences.

Branom, M. E. *The Project Method in Education*. Boston: R. G. Badger, 1919.

Chapter XIII, "The Project Method in History."

Hatch, R. W. "Projects in Citizenship"; in *The Historical Outlook*, vol. 13, pp. 50-59. (February, 1922.)

Hatch, R. W. "Teaching Modern History by the Project Method"; in *Teachers College Record*, vol. 21, pp. 450-69. (November, 1920.)

Jelik, Anne L. "The Project Method in Teaching Civics"; in *Elementary School Journal*, vol. 21, pp. 216-19. (November, 1920.)

Description of work in Theodora Hazel School, Chicago, Illinois.

Levin, S. M. "The Use of the Problem Method in History Teaching"; in *Education*, vol. 40, pp. 111-20. (October, 1919.)

Tryon, R. M. *Teaching of History in Junior and Senior High Schools*. Ginn & Co., 1921.

Pp. 82-93, the problem method, values and examples.

Woellner, Frederic P. *Education for Citizenship in a Democracy*. New York: Charles Scribner's Sons, 1923.

Chapter X, "Social Activities in the Grades."

Household Arts.

Charters, W. W. "The Project in Home Economics Teaching"; in *The Journal of Home Economics*, vol. 10, pp. 114-19. (March, 1918.)

Snedden, David. "The Project Method of Teaching Homemaking"; in *Educational Administration and Supervision*, vol. 5, pp. 94-96. (February, 1919.)

Mathematics.

Barker, Eugene H. "Applied Mathematics for High Schools"; in *School Science and Mathematics*, vol. 20, pp. 46-51. (January, 1920.)

Lindquist, Theodore. "Mathematics the Project Instrument"; in *School and Society*, vol. 17, pp. 343-49. (March 31, 1923.)

Rich, F. M. "A Few Live Projects in High School Mathematics"; in *School Science and Mathematics*, vol. 120, pp. 34-43. (January, 1920.)

Schanch, Wm. S. "An Experiment in Motivation"; in *The Mathematics Teacher*, vol. 12, pp. 1-9. (September, 1919.)

Science.

Eikenberry, W. L. *Teaching of General Science*. New York: Ginn & Co., 1922.

Chapter VI, "General Science and Method."

Hendricks, B. Clifford. "The Project as a Teaching Unit in High School Physics"; in *School Science and Mathematics*, vol. 21, pp. 163-72. (February, 1921.)

Stone, Charles H. "Optional Project Work in Chemistry"; in *General Science Monthly*, vol. 1, pp. 233-36. (May, 1917.)

Stone, Charles H. "The Making of a Match — A Project"; in *General Science Quarterly*, vol. 3, pp. 89-90. (January, 1919.)

Wade, Frank B. "The Project Method in Second Semester High School Chemistry"; in *School Sciences and Mathematics*, vol. 23, pp. 471-75. (May, 1923.)

Wake, William S. "The Project in General Science"; in *School Science and Mathematics*, vol. 19, pp. 643-50. (October, 1919.)

Watkins, R. K. "Technique and Value of Project Teaching in General Science"; in *General Science Quarterly*, vol. 7, pp. 235-56. (May, 1923.) Also vol. 7, pp. 422-30; 522-29. (January and March, 1924.)

Woodhull, J. F. "Project Methods in the Teaching of Science"; in *School and Society*, vol. 8, pp. 41-44. (July 13, 1918.)

Applications of project method to courses in science.

Woodhull, J. F. "Project of a Frozen Water Pipe"; in *General Science Quarterly*, vol. 3, pp. 107-11. (February, 1919.)

Woodhull, J. F. *The Teaching of Science*. The Macmillan Co., 1910. 248 pp.

Vocational Subjects.

Fish, Elmer H. "The Commercial School Shop"; in *Vocational Education*, vol. 1, pp. 82-99. (November, 1911.)

Nolan, Aretas W. *Teaching of Agriculture*. Boston: Houghton Mifflin Co., 1918. 227 pp.

Stimson, R. W. *The Massachusetts Home Project Plan of Vocational Agricultural Education*. United States Bureau of Education Bulletin, No. 8. 1914.

Vaughn, S. J. "The Assignment and Planning of Projects"; in *Industrial Arts Magazine*, vol. 8, pp. 392-96. (October, 1919.)

Whitcomb, Fred C. "General Project Method of Teaching the Industrial Arts"; in *Industrial Arts Magazine*, vol. 9, pp. 131-36. (March, 1920.)

Music, Physical Education, Religious and Moral Education.

Cottrell, Louise. "Pageantry on the Playgrounds of East Orange"; in *Playground*, vol. 17, pp. 339-44. (September, 1923.)

Edwards, Frank R. "The Place of the Project Method in Religious Education"; in *Journal of Educational Method*, vol. 1, pp. 138-44. (December, 1921.)

Gartlin, George H. "The Project Method in Harmony"; in *Musical Courier*, vol. 85, pp. 43-45. (August 10, 1922.)

Sharp, F. C. *Education for Character*. Indianapolis: Bobbs-Merrill Co., 1917.

Sleeper, Mrs. James F. "A Musical Venture in Project Teaching"; in *Journal of Educational Method*, vol. 2, pp. 165-73. (December, 1922.)

CHAPTER XII

QUIZZES, EXAMINATIONS, AND MARKING

1. *Needs for and purposes of testing:* Ordinary classroom testing procedures — Testing as an incentive — Testing for purposes of diagnosis — Testing for the purpose of obtaining school records — The importance of accurate marking.
2. *Commonly employed means of measurement:* The daily oral-recitation grade — Written papers and notebooks — Oral *vs.* written examinations — Announced or unannounced quizzes — Importance attached to written examinations — Different markings of the same paper do not agree — Educational objectives often not emphasized — Other objections to written examinations — Defense of the written examination — The use of ratios in averaging grades — The weighting of examination questions — Suggestions for giving written examinations.
3. *The distribution of marks:* Weaknesses of the percentage system — The letter system — The distribution curve, or "Missouri" system of marking — Pitfalls in the use of the "distribution" system — Danger in flexibility — Suggestions on the use of the distribution system — Points of superiority of the distribution system — Variations of the plan — Number of failing marks.

Questions and exercises — Selected references.

1. *Needs for and purposes of measurement*

Ordinary classroom testing procedures. When one steps into a classroom in an average American school, the one activity most likely to be going on is a form of question-and-answer testing. It is also quite generally conceded by students of educational method that much more time and emphasis are given to this type of testing than is wise, or than may be justified. The disproportionate place occupied by "reciting" and other forms of testing in the class hour means, of course, an inversely disproportionate amount of time given to those activities of student and teacher which partake more of the nature of teaching, and which contribute more directly to learning. The emphasis given to testing

also tends to exaggerate the individualistic pupil-teacher relation upon which we now look with much suspicion and disfavor.

Further, such overemphasis of the testing process tends to detract from that desirable interest in the recitation itself. The audience situation is destroyed. The student recites that which his fellows know, and with the consciousness that they know it. Again, such procedure is not conducive to that development of thinking power, initiative, and skill in discussion that would be possible were less emphasis placed on testing. The aim of the student in such classes is largely set upon successively passing the daily questioning of the teacher, and without reference to personal growth in the subject itself. Finally, if much of the testing is of a written nature, the burden upon the teacher arising from the necessity of reading and marking so many papers is an unwise one, as it requires time which might better be spent in preparation for classes or in recuperative rest and recreation.

From the standpoint of the need of testing for the purpose of arriving at an evaluation of the student's progress, it seems quite certain that much less time might be devoted to it, and with very little diminution in the accuracy of the marks assigned. Where the teacher meets her pupils in fairly small groups, say of not more than thirty or thirty-five students, marks may be assigned from observation in the teaching activities, and from the results of a few quizzes or examinations, the accuracy of which would be improved very little by continued testing.

Testing as an incentive. While what we have just said would seem to minimize the usefulness of class testing, the importance of skillful testing should not be underestimated. There is no question but there must be some testing of the results of teaching and study, and that the success of the

school and the teacher and of the pupil depends upon the degree of effectiveness with which this is done.

Testing serves as a stimulus to daily preparation. Many teachers believe that if testing were not systematically carried on, and in a searching manner, students would not prepare their daily assignments. There is no question but that, in many classes, the spirit of the teaching is such that, were the daily testing or reciting eliminated, no motive or interest in study would remain. There is also no doubt but that the final examination in high school, at the end of a course or a term, furnishes a very powerful stimulus to a review.

It is difficult to demonstrate to high school pupils the opportunity to use directly and immediately any considerable portion of the subject-matter taught. The storing-up of knowledge which one cannot see function in the immediate future is not a very gripping activity, and it is only human nature to desire to experience more definite and more immediate satisfactions. Though our faith in the ultimate outcome be ever so strong and be based on logic ever so invulnerable, continued working in the dark does not generate enthusiasm. So it seems desirable to devise, especially for young people, artificial means by which the acquisition and development of informations, habits, skills, ideals, and attitudes may be tested and measured. Nothing operates more surely to increase or to generate interest and effort than the experiencing of the results of effort.

Testing for purposes of diagnosis. Teachers likewise do not like to work in the dark; nor should they. Effective procedure and mastery depend upon taking stock frequently, and keeping a running inventory. It is important that we be able to measure the extent and degree of learning that is resulting from study and teaching, to note weakness and defects as measured by the desired levels of mastery, and

to adjust remedial procedure to the deficiencies revealed by diagnosis.

That diagnosis is an important function of testing should be borne in mind. Teaching must be done largely by "striking while the iron is hot." Results need to be checked constantly as a guide to teaching, and remedial teaching should follow closely upon the original presentation and study. Tests should furnish data disclosing the learning, or lack of it, that has taken place, and with respect to the individual processes, items of information, concepts, and appreciations. Measurement is necessary for the purpose of diagnosis.

Testing for the purpose of obtaining school records. Were testing not a desirable stimulus or necessary for diagnosis, there would be the necessity of testing for the purpose of school records. The classification and promotion of pupils are based upon the marks assigned by teachers. Report cards, given out by schools generally, are taken quite seriously by both pupils and parents, and the grades thereon are usually of much significance to them. Testing and measurement are necessary that accurate marks may be obtained.

School records often follow the pupil out into the world. They are now occasionally used, and will in the future be frequently used in giving the pupil educational and vocational guidance and in recommending him for positions. There is growing a movement on the part of institutions of higher learning, too, to limit entrance to those reaching certain determined levels of proficiency, as judged by the school records.

One of the most important uses for the measurement of school achievement is that of furnishing data as to the efficiency of various methods of teaching, the usefulness of materials of the course of study, types of school organiza-

tion, textbooks, teachers, time allotments, supervision, and various other factors in teaching. That school marks have not been more widely used for such purposes has not been because of the small need for data, but because of the unreliable and subjective nature of the marks; they have not in the past permitted of quantitative comparison.

The importance of accurate marking. Because so much depends upon school marks, there is great need for accuracy in the marking. Marks determine promotion and failure. The failure of a single pupil in a single subject is a matter of sufficient importance to bid us pause and employ great care. The heartache of pupil or parent, the discouragement, the possible sense of bitter injustice and unfairness, the inferiority complex which may result — these are not negligible matters. Retardation is a costly thing, both to the individual and to society. The elimination which follows in the wake of retardation is even more unfortunate, if capable pupils are eliminated as a result of improper marking.

Teachers who have approximately the same pupils enrolled in their classes sometimes vary quite markedly in the average marks assigned to them. A teacher of history and civics in a small high school, in which practically all students take history or civics each year, may give a very large number of A's and B's, and a very small number of D's and E's, while the teacher of English in the same school may give no A's, only a few B's, and a very large number of D's and E's. Such difference in marking is not rare, and it is not due to the relative difficulty of the two subjects. We would probably find the subjects reversed, and in about the same number of instances, in other schools. Neither is it due to the superior teaching ability of the teacher giving the larger number of high grades, nor can it be accounted for by the special aptitude or disability for the subject concerned of the students of that particular high school. The most

logical explanation lies in the different standards or temperaments of the two teachers.

The results of such inaccuracy and variability in marking are unfortunate. Pupils and parents are misled and confused by the varying standards of teachers, and the varying significance of a given mark. The unreliability of such marks as data for comparison, or the scientific determination of teaching materials, school organization, teaching methods, and supervision is obvious, and of such significance as to render them of little account. There is a great need for an improvement in the technique of measurement which will contribute to more uniform standards in marking. While less time may be spent in testing, what testing is done should result in accurate and reliable results.

2. Commonly employed means of measurement

The daily oral-recitation grade. The daily recording of marks based upon oral recitation and written work handed in is considered by some teachers as being the most accurate means for measuring student achievement. Many instructors record recitation marks at the conclusion of the recitation of each student. Among the advantages claimed for such a practice are:

1. The grade is recorded while the student's performance is fresh in the mind of the instructor.
2. A term grade based on such daily marks is a good estimate of the pupil's achievement, because it is based on a large number of questions.
3. The plan does not put a premium upon examining at the end of the course.
4. The formality of the practice stimulates daily preparation.
5. More complete and more careful recitations result.
6. Discipline is easier, because of the formality of the procedure.
7. It provides valuable training in thinking and oral composition.

On the other hand, daily marking on the basis of oral work

possesses several distinct limitations. To begin with, the presence of the teacher's pencil poised over a class book means almost certain destruction of naturalness and spontaneity in the class discussion. The opportunity to develop interest in discussion is destroyed. A premium is placed upon memory work, and upon question-and-answer teaching methods. It is not certain, either, that marks so derived are any more accurate than marks derived by methods which are free from these objections, and which do not restrict or hamper spontaneity. As for making the discipline easier, the teacher who can obtain discipline only by such methods need not abandon them. His success would hardly be greater, whatsoever the method employed.

Much better than this sort of daily marking, though, is the recording, at intervals of a few days and not in the presence of the class, such marks as seem desirable as to the recitation work of the various members of the class. Many teachers make such marks only once a week. Whatever may be lost in accuracy by marking less often, and from memory, will be offset many times over by the degree to which the practice lends itself to good teaching methods.

Written papers and notebooks. Some teachers have permitted themselves to become involved in a habit of slavishly evaluating daily written work and notebooks. Much of this material should not be read in detail at all. Possibly some of it should receive only a brief examination, merely to ascertain whether the students in general are getting the right idea. Where such is marked — in most instances it need not be graded — it is not necessary to assign marks. The attention of the student should be concentrated not on his marks, but on his errors. It is a good practice to require students to turn in a second time and with all errors corrected, all papers returned to them.

It is easy to require too much written work. Students

become careless in their hurry with it, and the drudgery of it operates to deaden interest in the work. This is particularly true of notebook work. Where notebooks are required, frequent inspection is desirable to prevent delinquency. As a means of measurement the notebooks should not be taken too seriously. The arbitrarily counting of a notebook as one fourth or some other fraction of the final grade should be done with caution. The student may learn his history by other means. Where daily or frequent papers are employed, it is not necessary to record each daily mark. General impressions are as likely to be of as much service. No one can tell, for certain, how much of a student's written work should be credited to the student himself; it may have been prepared by others.

Oral vs. written examinations. Teachers vary much in the dependence they place on oral quizzing and written examinations. Each has its peculiar merits. The oral quiz has the following advantages over the written examination:

1. There are no papers for the teacher to mark.
2. A great many more questions may be covered in the same amount of time.
3. Mistakes may be corrected at the time they are made, and when interest is present.
4. Each student profits by the mistakes of each of his fellows.
5. The oral reciting furnishes sensory repetition, which operates to fix the material.
6. The oral test trains in oral expression.
7. Some students are able to express themselves better orally than in writing.

Points of superiority of the written examination may be summarized as:

1. Each student answers the same questions, which operates to furnish a fair basis of comparison.
2. Except in very small classes any one student will have little

chance to answer oral questions, hence a more complete testing is possible.

3. Written examinations are much more likely to be carefully formulated than are oral questions.
4. Many students are handicapped in an oral recitation, who may write out their knowledge to advantage.
5. In oral testing, students by volunteering may manipulate the test so as to receive questions upon which they are best prepared.
6. The personal element is kept at a minimum in the written examination. The reader tends to lose sight of the writer, and indeed may arrange to be unaware of whose paper is being read.
7. The written examination serves much better as an incentive to a valuable type of review.

As a teaching instrument the oral quiz is to be preferred, but the written examination furnishes a better means of measurement.

Announced or unannounced quizzes. Many teachers find the device of giving occasional or even daily short unannounced quizzes very useful. These serve as a stimulus to daily preparation, as well as a check upon it. As students usually object to unannounced quizzes, the class should be informed that such is to be the practice if these are to be given from time to time. Unannounced quizzes should seldom, if ever, cover more than the immediate assignment. If a larger unit is to be tested, students should be given an opportunity to review. By failing to make announcement the incentive to a valuable type of review is not utilized. A combination of short, unannounced quizzes and occasional larger announced examinations works well.

In many schools a practice is followed of having examinations every month, six weeks, or quarter. Some teachers have quizzes regularly on certain days, once a week. Ordinarily the practice of announcing reviews and tests at the conclusion of the natural units in the subject-matter is better.

Importance attached to written examinations. Much significance has always been attached to and much dependence has been placed upon written examinations. In universities, colleges, secondary schools, and even elementary schools it has been an almost uniform practice to conclude the work of the year, or the course, with a fairly comprehensive and searching written examination, and the marks assigned to the students have depended in very large part upon the outcome of these written examinations. With the advent of forms of civil service, and of scientific employment selection in business and industry, the influence and importance of written examinations have increased and been extended beyond the immediate scope of the school.

In the face of the growing importance of written examinations, dissatisfaction with and criticism of written examinations appears also to increase. Many prominent educators have even advocated that they be abolished entirely. Teachers and students, and especially students, have complained much as to them. The last few years have seen a rather thorough canvassing of the limitations of written examinations, and considerable attention has been paid to means of improving them. These complaints would seem to indicate that a better means for testing might be found. Let us see what the objections are, and what seem to be some of the important limitations and weaknesses of the written examination as a means for testing the accomplishments of pupils.

Different markings of the same paper do not agree. In the first place, it is contended that the marking of examination papers is to a very undesirable extent a subjective matter. Teachers do not agree as to the mark that should be assigned to a given quality of performance. Dr. Ben D. Wood, of Columbia College, relates a striking illustration of this weakness. One of a group of expert readers employed

in marking papers in history wrote out, as a standard by which to mark the papers, what he considered model answers to the questions asked. This became mixed in with the papers being marked and was passed on to other readers who, taking it for a paper written by a student, marked it in turn along with the other papers. The marks given to this model paper by the different readers, he states, ranged from 40 to 90.

Some of the reasons why teachers vary in the marks they assign the same piece of work are not hard to see. In the first place, teachers have different standards of excellence. Some are inclined to be quite exacting and critical, while others are inclined to be lenient and liberal. This variation is contributed to by at least two factors: (1) The amount of knowledge and scholarship possessed by the teacher from which the criteria of a perfect paper are drawn; and (2) the disposition and temperament of the individual teacher, and the tendency to be fault-finding or to be liberal. Again, different teachers place different degrees of emphasis upon different elements in a paper or a solution. In other words they employ different rating scales. In the case of mathematics some may require only a correct answer; others may mark on method as well, or on method alone. Others again will consider the form of the paper — its neatness, the presence of all intermediate steps, and so on. Teachers vary, too, as to the weight to be assigned to different questions comprising the examination, and some may take into consideration rate, as well as speed. Another factor contributing to variability, though in a lesser degree, is the varying ability of teachers to distinguish small differences in merit. Still another factor is the varying degree to which teachers consciously or unconsciously include other factors than the subject-matter answers in their markings, such as the handwriting or the personality of the pupil to whom the

paper belongs, his behavior, likability, general intelligence, and other similar factors.

Teachers also vary in the marks they assign to the same paper at different times. To illustrate this variation an actual case may be cited. The writer recently requested four high school teachers of history to mark a set of twenty-eight papers, written as a final examination by a class in American history. The papers were numbered, and did not bear the names of the students who wrote them. After the marking, the marks were recorded and then erased from the papers. Four months later these same four teachers were asked to mark the same twenty-eight papers again. The two sets of marks were correlated only to an extent of .77, .74, .82, and .76 for the four teachers. One teacher assigned one paper a mark of 64 at one time, and a mark of 89 at another. The average differences in marks assigned between the two markings, for the four teachers, were 5.7, 6.4, 5.2, and 5.8. Others performing similar experiments have obtained quite similar results.

Educational objectives often not emphasized. A second shortcoming of the written examination as it is ordinarily administered, lies in the fact that in many instances the questions included do not test abilities in agreement with sound educational objectives. This may be attributed to several causes. It is difficult to test all objectives of school subjects equally well. Information products lend themselves to purposes of examination more readily than do outcomes of the nature of ideals and attitudes. Again, teachers do not always keep educational objectives in mind when making up their examination questions. Another contributing cause is the small likelihood that an appropriate sampling of the outcomes aimed at in the teaching will be obtained. The small amount of time usually taken for selecting examination questions aggravates

the situation, and the short amount of time that may be spent by the student in writing on the examination further limits the possibility of a complete sampling of the course or work covered.

Another weakness of the written examination is the chance that the answers or responses of the student will be determined somewhat by chance, or by irrelevant factors. Human effort and human skill vary from day to day, and a single examination does not constitute a very reliable measurement of ability. This is especially true where only eight or ten questions are included, and where the difference between unsatisfactory and superior scores may hinge on the answers to only two or three questions. In such a situation the chance element of interpretation, fluctuation of ability, or chance error is of too great significance to give the examination satisfactory reliability.

Other objections to written examinations. Another criticism of the written examination as commonly given is that this type of test affords undesirable training in several directions. Students learn to cram for examinations, and they tend to neglect work which does not seem to contribute to the ability to pass examinations. The examination system encourages memory work of an inferior type—the giving back of information and principles. The examination encourages cheating, and other individualistic practices and attitudes. Where examinations are given by superior officers, teachers tend to coach students for the examinations, and the methods and materials and instruction are unwisely adapted to preparing students to pass the examinations set.

Another charge laid at the door of the examination system is that it is injurious to health. The strain and worry of conscientious students is not healthful, and occasionally a breakdown results. Just how injurious written exami-

nations are to health no one can say with assurance, though it is very unlikely that, if administered carefully and sensibly, any great amount of damage will result.

A still further limitation of the written examination, it is claimed, is the time required of the teacher to prepare, give, and score the test, and the time required of the pupil to take it. In some high schools an entire week each semester is given over to examinations and the marking of papers, exclusive of the time spent in review, and this in addition to the shorter examinations given monthly or at the end of each six-weeks term. It is believed by many that teachers in most high school classes are able to mark their students approximately as accurately without the results of long formal written examinations as with them. It is felt that, at any rate, too much time is spent on them, and that a good portion of this time would be better spent in teaching activities. McCall estimates that sixty hours a year is the minimum spent by typical teachers upon preparing, giving, and scoring written examinations; the writer knows of one school system where not less than four or five weeks' time in each year is so spent.

In brief, then, it is claimed that examinations do not test progress toward recognized educational objectives; that the student's performance on them is not always a reliable indication of his achievement; that his performance is not objectively scored; and that they furnish training in objectionable directions and make unreasonable demands on the time of teacher and pupils. Stated another way, it is claimed that written examinations lack in validity, reliability, objectivity, and in administrative convenience, and that they tend to produce undesirable by-products.

Defense of the written examination. The written examination need not necessarily plead guilty to all the counts alleged. What the criticisms indicate is not so much that

the written examination is inherently bad, as that as usually administered it needs to be improved. More care and attention need to be given to the construction and scoring of the tests. They must be made valid — that is, they must be constructed so as to test progress toward the recognized objectives in the teaching of the subject, and to sample the important items of its content as well. Examinations need not necessarily be unreliable. It has been shown that examinations can be constructed so that the scores made by the students are not the results of chance or irrelevant factors. In fact in some instances the scores made by students in two similar forms of an examination, in which the questions and exercises were as nearly identical as could be made without a direct memory carry-over, were practically identical. Examinations may be so constructed that, regardless of who scores the papers, the scores will be approximately the same. The variation between the teachers scoring the same paper, and between the scores assigned by the same teacher on the same paper at different times, may be reduced or entirely eliminated by the use of modern technique in examination construction. The use of modern technique may also serve to reduce the time necessary to give and to score papers to a fraction of what is ordinarily consumed with the old-type examination. The sharp criticisms of the written examinations are, to a very large extent, criticism not of the examination itself, but of the technique of constructing and scoring it. As the technique and scoring of written examinations will be discussed, in some detail, in the following chapter, we will leave this point for consideration in that place.

The extent to which written examinations are made to shape the teaching and become educational objectives depends upon the use made of the examination scores. If the efficiency of teachers is to be judged largely by the examination scores of their classes, it must be admitted that

teachers will be likely to put their best efforts into preparing their pupils to pass the examinations set, and neglect all else. Likewise, if teachers rank their students largely on the basis of the examination scores, the students will subordinate all other learning to preparing for the examinations. The solution may be found in a more sensible emphasis upon examination scores, by both supervisor and teacher. Teachers also should learn that the direct memory type of teaching is not necessarily the best way to prepare their students for examinations. Students may learn more completely and more permanently through the use of better methods, as the problem-project, socialized methods, and visual instruction. Examination questions should be so formulated as to avoid placing a premium upon cramming and memory learning, and so as to encourage application and thorough mastery of the materials of instruction.

The use of ratios in averaging grades. There are two aspects to the question of how to weight different items in arriving at a measure of achievement that should receive consideration here. There is the question of "how much to count" daily grades, final examinations, written work, notebooks, and other sources of information regarding pupil achievement, and there is the matter of weighting the individual questions, exercises, or problems in a written examination.

Many teachers have adopted a scale or ratio in which daily grades, the final examination, and other test records are assigned definite values, which seem to them quite fair and reasonable. For example, some teachers count the final examination as one third, some as one fourth, and some as one half. It should be obvious that there can be no set rule as to how much any one item should count. The importance attached to any one item should depend upon the number of other items, and upon the relative reliance that

one may place in the various items. In classes where daily discussions give frequent opportunity for gauging the achievement of individual students, written examinations should be given much less emphasis and importance. The smaller the class and consequently the better opportunity to know the work of the students individually, the more importance may be attached to the grade given for daily work. The nature of the work in the subject also enters in. Written examinations should be of much more service, for example, in evaluating the achievement of students in history than in industrial or household arts, or in mathematics than in chemistry.

What the teacher should keep constantly in view is that in marking he is endeavoring to measure the progress and growth of the student in the subject, and that no artificial or mechanical scheme or ratio should be permitted to stand in the way of the realization of this purpose. The writer has known of cases where satisfactory students have been failed in courses because the results in the final examination, averaged in with its allotted proportion, brought the term grade below the predetermined passing mark. He has also known of cases where students were failed who had been doing very satisfactory work up to the time of final examination, but who, for reason of absence, did not take the examination and for whom a grade of zero was averaged in. It is not rare to find cases where teachers find themselves thinking, if not actually saying, "I believe you should have passed, but your grades didn't average up." No doubt, on the other hand, thousands of students have been marked liberally by teachers on final examinations in order that the "average" might not be below the passing grade.

The weighting of examination questions. No one would suppose that all questions in any given written examination are of equal difficulty, and it seems quite logical, if

they are not, that the more difficult ones should be weighted. There are two reasons, though, why such a procedure is not particularly helpful.

By a number of actual experiments it has been shown that teachers disagree as to the relative difficulty of test questions and exercises, and that even the best of teachers cannot estimate with accuracy the difficulty of questions as actually determined by student performance. One investigator asked twenty teachers to rate twenty-three problems in the order of difficulty. One problem was ranked first by one teacher, and twenty-first by another.

It has also been shown that the weighting of items in a test has very little influence upon the relative ranking of the pupils' scores in the test. The author, in an experiment with a colleague, scored a number of standard test papers which had been written by pupils in high school classes, in two manners: first by using the respective weights for each question suggested in the instructions, and then by the simple procedure of scoring each correct answer one. The correlation between the standings of the pupils scored one way with those when scored the other was very high, ranging between .95 and 1.00. In very few instances did a pupil fail to have the same rank in the class, when one method of scoring was used, as he had when the other method was employed. Unless there is a very wide discrepancy in the difficulty of the problems, little is to be gained in accuracy of measurement by weighting them for difficulty.

On the other hand, it may seem desirable to weight for emphasis. Those exercises which test more important information, skills, or ideals may be assigned higher weights, as compared with those exercises which test less essential outcomes. The same result might be obtained by incorporating in the examination more questions or exercises relating to the more essential or desirable outcomes.

Suggestions for giving written examinations. The following suggestions will prove helpful if they are observed by teachers in preparing and administering written examinations:

1. Care should be taken to sample adequately the work covered by the examination, with proper emphasis upon essentials.
2. A written examination should provide "range"; that is, it should contain some items which all or practically all students will be able to do successfully, some which only the best students should be able to do, and still others scattered through this span of difficulty.
3. Care should be taken that questions are clear and definite, and that they actually test that which is desired to be tested.
4. The question should indicate the degree of thoroughness or elaborateness which is desired in the answer, and the form in which the answer is desired, if a particular form is preferred.
5. Unless a "rate" test is being constructed, care should be taken to determine that the pupils will have time in the allotted examination period to complete the examination thoroughly and without hurry. A little extra time for reflection and re-reading the paper is desirable. If a "rate" test is being constructed, enough problems or questions should be provided that all students will be kept busy the entire time.
6. If questions are written on the blackboard, they should be read to the students, as well as placed where they may be seen clearly. The use of the mimeograph is recommended. Mimeographed sets of questions should be checked over by the teacher and errors noted which should be called to the attention of the pupils.
7. In giving written examinations teachers should consider the advisability of furnishing supplementary explanation, so that students in their excitement may not miss the point of the question.
8. Teachers should consider carefully the advisability of using some form of the new types of written examinations, as these are more objective, reliable, and economical in administering. These will be described in a following chapter.

The following suggestions should prove of value to teachers in marking written examination papers:

1. In most subjects it is very desirable to write out correct answers to the questions, or outlines of such, before marking any papers. Not only is this desirable for convenience, but such a procedure contributes very materially to the objectivity of the scoring. Often teachers will find their standards rising during the marking of a set of papers because of the failure to get completely in mind at the outset all the points in a correct answer. As more points necessary to a perfect answer are suggested to the instructor during the marking of the papers, the standards of a perfect answer become higher.
2. The teacher should make every effort to measure nothing but the outcomes aimed at in the examination. The teacher should endeavor to lose sight of the authorship of the paper. He should avoid, as far as possible, becoming aware of whose paper is being marked.
3. Care should be taken not to permit handwriting, or "playing up" to the pet views of teacher, to influence the marking.
4. Except in courses in English, marks should not depend upon spelling or other errors in English. These should be noted, and it is not a bad procedure to refuse to give credit for a paper until corrections have been made by the pupil, or to accept a paper so poorly written as to amount to lack of courtesy, but the mark finally given should not be influenced directly by the quality of the English. Nothing should be implied from the foregoing to condone any failure of high school teachers to coöperate properly in developing ideals and habits of good speech.
5. It is considered better practice to mark the answers to each question in turn, through the entire set of papers, rather than to mark each paper completely in turn. Such a procedure has two advantages. First, it operates to prevent a change of standards from one pupil's paper to another, and secondly, it is more economical of time as it enables the reader to keep in mind the standards by which he is judging the answers to each question.
6. Where the latter system is used, it is convenient to score answers on a numerical basis, counting each question 5, or a similar number, and to translate the total scores into letters later. To illustrate, in scoring one examination there was allowed, for perfect answers to the seven questions asked, the

following numbers of points respectively: 5, 4, 7, 5, 5, 6, and 5. Thirty-seven points then constituted a perfect score.

7. Examination papers should ordinarily be marked, and not corrected. Errors should be indicated by the reader, but the student should make the corrections. Of course, in those instances where it is unreasonable to expect the student to be able to find the right answer, it may be given on the paper. Except in the case of final examinations, it is a good procedure to insist upon the students returning their examination papers after correcting them, and to allow some small additional credit for well-corrected papers.
8. Note should be taken of the errors that are characteristic or common to the papers, so that the test may achieve its diagnostic possibilities and that remedial instruction may be given on the weak points.

3. *The distribution of marks*

Weaknesses of the percentage system. Until a few years ago the common marking system was the percentage system. Unscientific and the source of much error as it was, people had become used to it, and retained it, notwithstanding its defects. To-day it is slowly giving way before the introduction of more sensible and more scientific systems. Its more important defects we shall here point out.

A system of 100 possible degrees of quality is absurdly finely graduated. Even if we note that the bulk of the use of it was confined to the upper 40 per cents, there are still more degrees of merit available than is necessary or possible to discriminate among. As a young superintendent of schools the writer used to marvel at the precision of some of his teachers whom he used to visit, as he passed from desk to desk and saw markings of 84's and 93's on specimens of penmanship. He suffered also from a distinct feeling of personal inferiority, in his ability to grade, as he noted on the report cards as he signed them, that occasionally a fraction seemed necessary to make the proper dis-

tinctions. These cards carried to youngsters and to parents distinctions and comparisons which did not exist. The faith and meaning put by pupil and parent into a margin of one or two points in such a scale was misplaced confidence, and often the results were unnecessarily hurtful. The reliability and objectivity with which teachers can distinguish degrees of merit does not in any way justify the use of any such fine distinctions.

The meaning of 70 or of 85 on a percentage system has never been clear, nor does there seem to be any way of giving such marks definite meaning. The 70 of some teachers means the 80 of others. What quality of work is signified by a grade of 80 varies from teacher to teacher. What is worse, it varies with the same teacher from one day to another, in the same subject. Let us suppose that on two successive days two tests are given in French, history, or some other high school subject. One day the class averages 86, and the next day 79. A literal interpretation of the marks suggests that the class has forgotten 11 per cent of its knowledge of French in twenty-four hours. William, who made 92 the first day, is confronted with a 78 the second. William would appear to be slipping rapidly. To have any meaning the mark must be referred to the relative difficulty of the test. No one knows just what that is, and certainly the pupil, parents, or future investigator of school records does not.

If marks on a percentage system be thought to represent percentages of perfection, a little reflection will make the idea appear absurd. No student short of a genius would ever attain 70, the common passing grade, were such interpretation applied literally.

The letter system. There is little need for more than five to ten different marks in a system of grading. It is difficult as well as useless to have more. All the purposes

of ordinary schoolroom measurement can be achieved by a system so limited. What the letters employed are — whether A, B, C, D, and E; or E, S, M, I, and F — does not matter. Whether teachers wish to note slight differences within a given group by employing plus and minus marks after the letters is not significant; even if no good results, little harm can come from the practice. As a concession to those who find it hard to get away from the old percentage system a table of equivalents, as A=95–100, B=85–95, etc., sometimes is used, but is not to be recommended.

The letter system, though, lacks uniformity, and it is not standard among teachers. The A of one teacher means the B of another. It is nothing uncommon to find teachers, in the same school, with standards varying as much as is indicated in the following comparison showing the percentages of each grade given in one examination.

	A	B	C	D	E
Teacher X	30%	30%	22%	14%	4%
Teacher Y	3%	14%	35%	33%	15%

The distribution curve, or “Missouri” system of marking. The inconsistencies and the glaring weaknesses of the percentage system, and the lack of uniformity and standardization of the letter system, had been apparent to students of education for some time, but it remained for those interested in measurement and the study of individual differences to come forward with a new and better system.

Students of human nature and natural phenomena had alike noticed that in the measurement of any trait the distribution quite commonly took a form giving a curve similar to the curve of normal probability, or curve of error, as it is sometimes called. This type of curve is shown in the figure given below.

As one goes further from the average, in either direction,

one finds a steadily decreasing number of cases, and the great mass of cases cluster around the average. When intelligence tests were applied to children, it was found that intelligence seems to be similarly distributed; that is, there are many of average intelligence, a much smaller number of

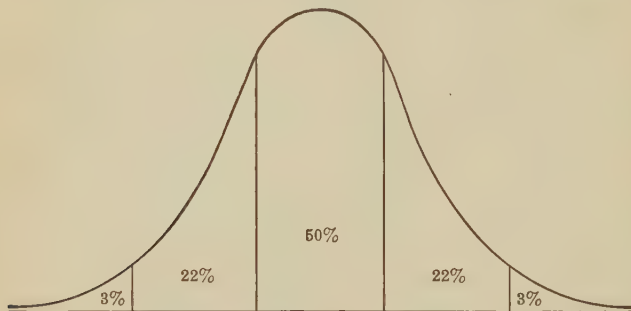


FIG. 1. THE THEORETICAL PROBABILITY CURVE

slightly superior or inferior intelligence, and a very few of exceedingly superior or exceedingly inferior intelligence. The groups are not clearly demarcated, but shade off imperceptibly from one to another.

All records we had of school abilities indicated that these too were similarly distributed. Finally Dr. Max Meyer, of the psychology department of the University of Missouri, with the coöperation of others who were interested, was able to persuade the faculty of that institution to adopt a marking system which was based on the normal-distribution curve. The plan called for the use of five marks: E = excellent, S = superior, M = medium, I = inferior, and F = failure. In a class which appears to be a normal class, of average ability and normally balanced, approximately fifty per cent should receive a mark of M, twenty-five per cent a mark of either S or E, and a like proportion a mark of either

I or F. Of those superior to M, it was supposed that the very large majority should receive S. In practice less than five per cent receive E, which is as it should be.

This conception as to grading has spread steadily, though somewhat slowly, and is to-day used in a number of colleges and schools. Not all schools employing it adopted it in the exact form in which it was worked out at Missouri University. Various types of distributions of the grades were made, as 7, 24, 38, 24, and 7 per cent; and 10, 20, 40, 20, and 10 per cent; and the letters A, B, C, D, and E were substituted in some places. The grades given in the elementary courses at Harvard University during a period of two years were distributed as follows: 7, 21, 44, 20, 7 per cent.

Pitfalls in the use of the "distribution" system. The division of marks exactly into any such percentages assumes an approximately normal distribution. Such a distribution is very rarely obtained when dealing with a small number of cases, and even where several hundred cases are involved a rather ragged approximation usually results. Because this is true it is not expected that any one class, however large, should earn marks in the exact proportion of the normal curve.

On the other hand, an intelligent use of the plan does not call for the exact division of every class. If the division agreed upon be 7, 21, 44, 21, and 7 per cent, it is not expected that 7 per cent of any class must fail and no more or less than 7 per cent must receive the highest mark, or that exactly 44 per cent shall receive the middle mark. It is quite possible that there will be no failure, or that there will be 20 or 25 per cent of failures, depending upon the ability and effort of the individual class. The teacher who tells a student that he really deserved an A, but that there being only twenty-eight in the class he could give but two A's, and as the student ranked third he was compelled to give him a

B, is either insincere or does not understand the system. Likewise a teacher who informs a student that "seven per cent had to fail," or who assigns a certain per cent of A's when there are no outstanding students in the class, is not making an intelligent use of the plan.

In fact it is perhaps best not to set up any definite dividing line between the two superior marks and the two inferior ones. At Missouri University the plan was to give approximately 25 per cent of the students either E or S, and a like percentage either I or F. No definite division of these fourths between E and S, and between I and F was intended, other than that the mark of E should be reserved for the truly exceptional and outstanding students, and that in a class of ordinary ability and industry there would very likely be many more S's and I's than E's and F's. Where such a system of marking is employed, it is necessary for each instructor to estimate in what manner and to what degree the particular class deviates from a normal distribution. It is quite possible that in a given class there will be an unusually large number of inferior or superior students, or of both, or that there will be an unusually large number of medium students. To what extent this is true, for any given class, must be left to the individual teacher to determine.

Danger in flexibility. However, this flexibility, which is not only sensible but advisable, carries with it a danger into which some teachers fall and which operates to defeat one of the purposes of using such a system, namely, uniformity among teachers. Some teachers think that every class is an unusually superior class, and tend to assign an unduly large number of higher marks. Others are convinced that every class is a weak or an indolent one, and pile up their marks in the lower levels. Still others tend to be notionate, thinking this class a group of intellectual giants, and another one an aggregation of hopeless inferiors.

There are two rules which should be kept in mind on this point. One is that the marks assigned by a given teacher for a number of classes which aggregate several hundred students, ought to approximate somewhat closely the normal distribution. The other is that teachers should be very conservative and slow to come to the conclusion that any given class deviates widely from a normal distribution. The chances, for example, of a class of ten students all being in the upper fourth of students in general, unless they have been very carefully selected, is almost negligible. The likelihood that eight out of ten such students are really superior to seventy-five per cent of students in general is not great. No doubt the time will soon be at hand when most high school classes will have been given a standard achievement test, so that, by comparison with the standard norms, the teacher may estimate somewhat objectively how much inferior or superior any particular class is. This then will serve to correct the difficulties just stated.

Young students should not be discriminated against. A fallacy into which high school teachers frequently fall is that of giving large numbers of low marks to first-year students, and large percentages of high marks to third- and fourth-year students. If a course of study is properly adapted to the needs and capacities of the pupils, and is properly taught, such a situation ought not to occur. Senior work should be as difficult for seniors as freshman work is for freshmen. The results of such a practice are exceedingly unfortunate. The practice, which is somewhat general, plays no small part in the high mortality in the ninth grade. It is certain that the extent to which the practice prevails probably is due to the fact that teachers find it easier, from the standpoint of the personal equation, to give low marks to younger and relatively less well-known students in large classes, than to older students of longer

acquaintance. This is immoral, and ought not to be done.

Suggestions on the use of the distribution system. Ordinarily the marking of papers may be done by the use of an auxiliary scale, as was suggested earlier in the chapter. As indicated there, the score of a perfect paper need not be 100. If the scores are to be translated into letters later, no one number of possible points has any peculiar advantage. Papers may be graded on the basis of 10, 100, 37, 50, 20, or any other number. It is not difficult to turn such scores into marks.

Let us illustrate by an example. Suppose that a class of 24 students were to make the following marks on the basis of 100: 95, 91, 90, 90, 90, 86, 85, 85, 84, 84, 82, 82, 81, 80, 80, 80, 80, 76, 75, 75, 73, 71, 70, 70, 68, 54, 48. Suppose now that the plan was that used at Missouri University, 25 per cent of E's and S's, 50 per cent of M's, and 25 per cent of I's and F's. What marks should you assign? In the table on page 385 is a suggested distribution of the marks, and also two others for scores made on the basis of 37 and 15 for perfect papers. It will be noted in the tabulation that the proportion of marks in any level varies fairly widely. This is to be expected, and occasionally even greater variations may be expected. Occasionally a test may be somewhat too easy, and as a result a number of high scores result — possibly a number of perfect scores which must all be rated A or E. Occasionally also, due to general lack of effort on the part of students or to outside distraction, a large number of failures or low scores will occur. These scores should not be arbitrarily distributed over the range of marks; they must be piled up in the proper levels. Throughout a course, with a fairly representative class, these situations should tend to balance each other, so that at the end of the course or term the average standing will approximate a normal distribu-

100 BASIS	37 BASIS	15 BASIS
95 } E = 4%	32 } E = 0%	15 } E = 11%
91 } S = 14%	31 } S = 30%	15 } E = 11%
90 } S = 14%	31 } S = 30%	15 } E = 11%
90 } S = 14%	31 } S = 30%	13 } S = 18%
90 } S = 14%	31 } S = 30%	13 } S = 18%
86 } M = 44.5%	31 } S = 30%	12 } S = 18%
85 } M = 44.5%	30 } M = 52%	12 } S = 18%
84 } M = 44.5%	29 } M = 52%	12 } S = 18%
84 } M = 44.5%	26 } M = 52%	11 } M = 37%
84 } M = 44.5%	26 } M = 52%	11 } M = 37%
82 } M = 44.5%	25 } M = 52%	11 } M = 37%
82 } M = 44.5%	25 } M = 52%	10 } M = 37%
81 } M = 44.5%	24 } M = 52%	10 } M = 37%
80 } M = 44.5%	23 } M = 52%	9 } M = 37%
80 } M = 44.5%	23 } M = 52%	9 } M = 37%
80 } M = 44.5%	21 } M = 52%	9 } M = 37%
80 } M = 44.5%	21 } M = 52%	9 } M = 37%
76 } I = 30%	20 } I = 7%	9 } M = 37%
75 } I = 30%	20 } I = 7%	8 } I = 26%
75 } I = 30%	19 } I = 7%	8 } I = 26%
73 } I = 30%	19 } I = 7%	8 } I = 26%
71 } I = 30%	18 } I = 7%	8 } I = 26%
70 } I = 30%	16 } I = 7%	7 } I = 26%
70 } I = 30%	15 } I = 7%	7 } I = 26%
68 } F = 7.5%	10 } F = 11%	6 } F = 7%
54 } F = 7.5%	10 } F = 11%	4 } F = 7%
48 } F = 7.5%	8 } F = 11%	0 } F = 7%

tion, or as near to it as the personnel of the class would justify.

In dividing the scores into groups, it is a sensible procedure to look for gaps near the theoretical division point. For example, in the first tabulation given above, the theoretical dividing point between the S's and M's would fall just below the score 85. Obviously it is much better to place it between 90 and 86. In the same distribution the lower quarter begins just below 73. Because the scores seem to drop off rapidly from the better scores it seems better to place the

break at a more pronounced gap, as between 80 and 76, though doing so operates to place 37.5 per cent of the class in the groups I and F. By the same reasoning in the second tabulation there would be no E's, though theoretically the score 32 should be so rated, and again in the same distribution there would be assigned only 7.5 per cent of I's, and a total of 18.5 per cent of I's and F's.

Points of superiority of the distribution system. The distribution system in grading possesses several advantages peculiar to it. The use of the system tends to standardize marks among teachers in the same school, and the benefits accruing from such standardization are several and considerable. These benefits may be summarized, as follows:

1. It tends to prevent bad feeling between teachers who cannot understand the standards of each other, and who are likely to imply bad motives.
2. It tends to prevent the confusion of parent and pupil, who are alike inclined to feel that an A is an A, no matter who gives it.
3. It gives the marks some objective significance for purposes of school records, and the marks of different teachers may be compared in a quantitative way for purposes of measurement in experiments and investigations.

The use of the plan gives marks which carry more meaning to both parents and pupils. After all, one of the most significant items in judging a score, or a mark, or a measure, is its relation to other scores. To say to the average reader of this book, for example, that a certain college athlete made a running broad jump of 14 feet and 4 inches has little significance, because the average reader does not know what other people are able to do in this particular track event. When one is told that the record is something over 25 feet, and that any first-rate track team will have on it at least one man who can do better than 20 feet, and that high school athletes quite commonly jump more than 18 feet, we are

able to attach some meaning to a jump of 14 feet and 4 inches. Similarly, parents need to know how their children rank with other students. They are generally desirous of ascertaining what marks other children of their acquaintance make in the same classes, and make up their minds as to how well their son or daughter has done with these in mind as standards. Scores depend for meaning upon relative standing. When a student receives a mark of S under the Missouri plan, the parent knows that the child ranks in the upper quarter, and that he is a superior student though not outstandingly superior. The parent is able to attach meaning to the mark without making investigation to determine the individual marking standards of each teacher.

The use of this type of marking plan usually operates to protect the student from two types of teachers: the teacher who, in an effort to build up a reputation for high standards, or because of personal persuasion or imitation, fails unwisely large numbers in her classes or gives large numbers of discouraging marks; and the teacher who gives high marks in such numbers as to remove all incentive, as far as marks are concerned. That the system operates to distribute marks in conformity with the actual distribution of intelligence has been pointed out.

Variations of the plan. As indicated previously, there is no one best plan of dividing the distribution into certain percentages. The Missouri plan is as widely used as is any. However, in a true normal curve the points of declination are about one standard deviation each way from the mean, and include between them approximately 68 per cent of the population along the middle between which it is hard to distinguish. For this reason a plan which seems quite reasonable, and has perhaps a little more scientific basis to it, is that of dividing into the following groups: E and S (or A and B), 16 per cent; M+, M, and M- (or C+, C, C-) 68 per

cent; I and F (or D and E), 16 per cent. In some schools, instead of having two superior marks, one of which is given only exceedingly rarely, only A (or E) is used to designate the superior group, and + is added in the cases of the exceptionally superior students, the idea being to avoid having to give a second mark to distinctly superior students.

In some schools only the passing marks are distributed according to the curve of probability. This is a very good practice. It automatically precludes the error of giving low passing marks to students who have really failed. Again, because of the lack of interest or application, there will always be pupils falling short of normal achievement, and as a result there should be a larger number of pupils below the average possible achievement than above.

A compromise plan is that of giving two sorts of marks, one a letter or a number not based on the distribution system, and followed by a subscript indicating the quarter of the class into which the mark falls. For example, a student may receive, in his four high school subjects, the following marks: 72_{IV}, 84_{II}, 81_{III}, and 88_{III}, indicating that he ranks in the second quarter of his class in the first two subjects, and in the third quarter in the latter two subjects. In the example given above the true relative significance of the marks, 84 and 88, is brought out by the subscripts _{II} and _{III} respectively. In one subject 88 may be attained by students just a little below average, in the other 84 is attained by only students above average. In other words it would seem that a mark of 84 given by one teacher or in one class represents a higher degree of achievement than a mark of 88 given by another teacher or in another class. This plan tends to compromise with parents who are used to the old-fashioned percentage system, and with teachers who cannot adjust themselves to the newer distribution system of marking.

Number of failing marks. It has quite generally been thought unnecessary to differentiate between the degrees of merit of all work below the passing mark, though where the percentage system is employed it is quite generally done. The failure to do so often leads to inaccuracies worthy of consideration. Let us suppose the case of two students who receive the following marks, in a dual system of marking, for a semester of three six-weeks periods, 70 being the passing mark.

	1	2	3	EXAM.	Ave.
Student A.	79 = D	71 = D	71 = D	30 = F	61 = D
Student B.	79 = C	68 = F	67 = F	69 = F	71 = F

Here student A averages 61 and passes, while student B averages 71 and fails. The difference between the work meriting 30 and that receiving 69 is a very significant difference, and should not be ignored by calling both levels of work "F."

It is perhaps a safe plan to record as many levels of unsatisfactory or failing work as of satisfactory or passing work. A system of seven grades or levels, four passing and three failing — as Honor, Superior, Medium, Passable, Unsatisfactory, Inferior, Very Inferior — seems very useful. The employment of such a system will tend to offset the tendency to pass all pupils but the most flagrant and conspicuous failures. Let us consider a hypothetical set of marks — P, P, P, U, I. These marks average U, or unsatisfactory — the highest failing grade. If but one failing grade is employed, the same marks average P, or passing. It is worth while to know, for other purposes than the determination of promotion, what level of inferiority the failing pupil has attained; as for investigations, for the pupil's own guidance, and for determining whether or not a pupil should continue the subject.

QUESTIONS AND EXERCISES

1. What are the purposes of measurement in high school teaching?
2. Read over carefully the points of superiority of the oral quiz and those of the written quiz and evaluate each, giving your reason.
3. What is your belief as to the usefulness of unannounced quizzes?
4. Be able to state the weaknesses of the written examination, and to add one to those given in the chapter.
5. Do you agree with each of the suggestions for giving written examinations? Can you add two or three others?
6. List the objections to and the advantages of the old percentage systems of marks.
7. List the objections to and the advantages of the "distribution" system.
8. Make a list of ten suggestions for using the "distribution" system.
9. What do you believe would be the effect of not using any school marks at all? Of giving pupils only + or - as grades?
10. How much do you think final examinations should count in the final grades of pupils?
11. Evaluate the plan of giving marks not based on the distribution, but with subscripts showing into which quarter of the class the pupil falls.

SELECTED REFERENCES

- Boring, E. G. "Marking System in Theory"; in *Pedagogical Seminar*, vol. 21, pp. 269-79.
- Breed, F. G. "Administering the Relative Marking System"; in *School and Society*, vol. 5, pp. 474-77. (April 21, 1922.)
The distribution system of marking as employed at the University of Michigan.
- Colvin, S. S. *An Introduction to High School Teaching*. New York: The Macmillan Co., 1917.
Chapter VIII, "Testing the Knowledge of the Pupil."
- Davis, S. E. *The Work of the Teacher*. New York: The Macmillan Co., 1918.
Pp. 255-78, short but practical.
- Deatrick, E. P. "The Use of Text and Notes During Examinations"; in *School and Society*, vol. 21, pp. 327-29. (March 14, 1925.)
An argument for the idea of holding pupils for organization and recognition of facts rather than for ready recall of details.
- Handschin, Chas. H. *Methods of Teaching Modern Language*. Yonkers: World Book Co., 1923.
Chapter XIII, Reviews, Tests, and Examinations.

Holley, C. E. *The Teachers' Technique*. New York: The Century Co., 1922.

Chapter XIV, excellent practical discussion; one of best.

Leonard, Sterling Andrus. "How English Teachers Correct Papers"; in *English Journal*, vol. 12, pp. 517-32. (October, 1923.)

Meyer, Max. "Grading of Students"; in *Science*, vol. 28, pp. 243-50. (August, 1908.)

A discussion of how to apply the distribution system.

Monroe, Walter Scott, DeVoss, James C., and Kelly, Frederick James. *Educational Tests and Measurements*. Boston: Houghton Mifflin Co., 2d Rev. Ed., 1924.

Chapter I, Introduction. Limitations of teachers' marks and ordinary examinations.

Nutt, H. W. *Principles of Teaching High School Pupils*. New York: The Century Co., 1922.

Chapter VIII, "Measurement of the Results of Teaching." Emphasis on diagnostic measurement. Suggestions for testing.

Odell, C. W. "High School Marking Systems"; in *School Review*, vol. 33, pp. 346-54. (May, 1925.)

A survey of marking systems in use in high school with suggestions on marking.

Parker, S. C. *Methods of Teaching in High Schools*. Ginn & Co., 1920.

Chapter XXII, "Measuring the Results of Teaching." Types of tests, teachers' marks, standard tests.

Rugg, H. O. "Teachers' Marks and the Reconstruction of the Marking System"; in *Elementary School Journal*, vol. 18, pp. 701-19. (May, 1918.)

Silberstein, Nathan. "Variability of Teachers' Marks"; in *English Journal*, vol. 11, pp. 414-24. (October, 1922.)

Describes variations and causes of differences between marks assigned pupils' papers in English.

Tryon, Rolla M. *Teaching of History in Junior and Senior High Schools*. New York: Ginn & Co., 1921.

Chapter VIII, "Measuring the Results of History Teaching." Aims of examinations and tests and standard tests and scales. Bibliography.

Twiss, E. R. *Principles of Science Teaching*. New York: The Macmillan Co., 1917.

Chapter XXIV, "Examinations and Tests"; also pp. 153-58.

Wayland, J. W. *How to Teach American History*. New York: The Macmillan Co., 1914.

Chapters VIII, IX, and X.

CHAPTER XIII

THE USE OF STANDARD ACHIEVEMENT TESTS AND SCALES

1. *Types and nature of school tests:* The coming of standard means of measurement — Types of school tests — Intelligence tests — Prognostic tests — Achievement tests — Types of achievement tests and scales — Construction of standard tests.
2. *Uses and values of standard tests for the classroom teacher:* Administrative uses — Supervisory purposes — Uses in rating teaching — Diagnostic testing — Using standard tests for motivation — Standard tests as a basis for marks — Experimental investigation.
3. *Using standard tests and scales:* Selecting tests to use — Purposes for which tests are to be given — Validity of the tests — Reliability — Objectivity — Administrative economy — The question of usable norms — Administering standard tests — Scoring standard tests — Dangers and limitations.
4. *Statistical interpretation of test results:* Frequency distribution — Measures of central tendency — Measures of range and dispersion — Measures of relationship.
Questions and exercises — Selected references.

1. *Types and nature of school tests*

The coming of standard means of measurement. The relative efficiency of different types of school procedures, different plans of school organization, and the nature of the contents of the curriculum have always been matters of debate and opinion, and for long they bade fair to remain always in the realm of controversy and philosophy, because we had no means of measuring accurately the product of the school. Until quite recently we had no devices or system of standards by which the relative values of different plans might be determined. That plan prevailed which attracted the men who could argue most effectively for it. No serious attempt could be made to settle questions experimentally and in quantitative and objective terms, for there were no quantitative units for school work.

Teachers for long were employed, promoted, and discharged upon opinion and general impressions, and superintendents, principals, and teachers were forced to spend an important share of their energies in activities not of educational value in order that they might maintain their individual positions of leadership. They and their labors were judged by the opinion of their patrons and employers. There was no scientific means by which teachers could be certain of what progress and achievement their classes were making, or by which they could compare them as to progress and achievement with similar classes elsewhere.

Within the past two decades a new type of tool has been given teachers and school officers in the form of what have come to be known as *standard tests* and *scales*. Beginning first with such elementary school subjects as handwriting and spelling, these tests and scales have since been evolved and more or less standardized for practically all of the studies of the elementary school, and, more recently, for many of the high school subjects as well. Each year sees these scales improved by further use and standardization, with the establishment of *norms of accomplishment*. While standard tests and scales for the elementary school subjects have by now been rather well worked out, new tests and scales for the high school subjects are still appearing. Further, the standard test idea has been expanded in a number of new directions, with the creation of a number of new measuring instruments of importance as a result.

Types of school tests. As a result to-day we have several distinct types of tests and scales for use in schools. There are the following main types of tests:

1. Intelligence tests.
2. Prognostic school tests.
3. School achievement tests.

4. Physical ability tests.
5. School building rating scales.
6. Medical examination tests.
7. Teacher rating scales.

The first three of these types of tests are the ones which the classroom teacher will need to know about.

Intelligence tests. School achievement tests, which aim to measure achievement in the school subjects, are quite frequently confused with intelligence tests and prognostic tests. Intelligence tests do not measure achievement in any school subject; they are intended to measure general mental capacity and ability. Examples of this type of tests are the widely employed Stanford (or Terman), and the other revisions of the original Binet-Simon intelligence tests: the National, the Otis, the Dearborn, the Terman group, the Haggerty, the Illinois, and the Detroit kindergarten intelligence tests. All these forms of intelligence tests are employed for such purposes as to determine the brightness and dullness of children, to furnish data for dividing classes into slow and rapid sections, and to estimate possible future mental development.

There are, in addition to these tests of general intelligence, mental tests which are calculated to test special mental abilities, such as rote memory, logical memory, imagination, various types of learning, association, and other mental factors. Among these are the ink-blot test, various substitution tests, cancellation tests, the Kent-Rosanoff association tests, and a very large number of others. Still other types of mental tests are those which measure temperament, will, and character traits, such as the Downey Will Profile, and the Chassell Character Scales.

Prognostic tests. Prognostic tests may also be regarded as a type of mental tests in that they attempt to measure the capacity for a special school subject, or for some vocational

activity. Among such tests may be named the MacQuarrie Tests of Mechanical Aptitude, the Rogers Prognostic Mathematics Tests, the Seashore Music Tests, and the Handschin Tests for Predetermination in Foreign Language.

Many business and industrial concerns employing large numbers of men and women, have recently developed prognostic tests and are using them to guide them in selecting workers who will learn to do, most readily and well, the special types of work they wish done.

Achievement tests. Those tests which measure the progress and proficiency of school children in school subjects are usually referred to as "achievement" or "subject-matter" tests. One is not able to give a definition of a "standard" test or scale which will be universally accepted. What is meant in general is a test or scale which may be used in schools generally, and which will measure achievement objectively, and in units which are comparable and uniform. This means that to be "standard" a test or scale must:

1. Be such that it may be used in schools generally for the subjects for which it is intended.
2. Be so constructed that scores obtained by its use will be independent of the person who scores the paper, i.e., so as to be objective.
3. Be such that the units of the scale will represent approximately equal degrees of achievement.

Nearly all standard tests and scales are accompanied by standard directions for giving and scoring them. For most of them norms have been determined. Norms are usually furnished in the form of a table of scores which the average student is expected to make at the various stages of his development. For some tests in the elementary school there are norms for the close of every semester's work. The average or median score of a very large number of

pupils in different school systems, usually a thousand or more, is commonly taken as the norm. Sometimes norms are also stated in such form as to show range. Figures are furnished with the tests which represent the median achievement of the upper 50 per cent of students, and of the lower 50 per cent of students. Such scores are referred to respectively as the upper and the lower quartile norms.

Types of achievement tests and scales. There are several types of achievement tests and scales, and they may be classified in more than one way. Tests may be classified as of the "survey" or the "diagnostic" type, or as "rate" tests, "power" tests, or "quality" scales.

Survey tests are tests which are serviceable chiefly in measuring the achievement of the pupil, class, or school. Diagnostic tests are so constructed as to disclose in what special outcomes or types of achievement weakness or strength exists; that is, they show not only that weakness does exist, but also where it exists. Most of the earlier tests were of the survey type; many of the more recent tests belong to the diagnostic type.

Many of the earlier tests were rate tests, rather than power tests. They tested how rapidly a student could perform tasks of a given uniform level of efficiency. Power tests aim to show how difficult a task a student is able to perform, or what various types of exercises or problems he can do or answer. Because the component exercises are not of equal difficulty, a rate score on a power test is impractical. On a rate test, however, it is possible to obtain a measure of speed.

Another type of measuring instrument is composed of specimens of different degrees of quality of achievement, very carefully and scientifically arranged, by which the achievements of a class or pupil are rated. Tests for composition and handwriting are usually of this type, which is called a *quality* chart or scale.

If sets of specimens for measuring quality or the material in power tests are so selected and arranged that the various specimens, problems, or items represent equal steps of quality or difficulty, or if the difference between successive steps is known in comparable units, the instrument is referred to as a "scale."

Construction of standard tests. It is not practical to give here a detailed account of how standard tests are constructed. The method of construction varies with the type of test or scale, and in most instances involves a large amount of somewhat technical and complex statistical procedure, a description of which would be quite tedious to read.

The construction of a meritorious standard test or scale involves much more time, effort, and ability than is commonly supposed. A very thorough study and analysis of the objectives of the subject to be tested are necessary, followed by an analysis of the information, habits, skills, ideals, and attitudes which constitute the means by which the accepted objectives may be attained, and which contribute most heavily to their realization. It is necessary to select exercises, problems, questions, or other test stimuli designed to produce responses from the pupil which will measure the possession of the information, skills, habits, ideals, or attitudes in question. Such exercises must be chosen as will measure these outcomes and nothing else; such that the response may be marked objectively and quickly; such that will insure consistency of response from pupils; and such as will test all degrees of possession of the outcome desired to be tested.

In the construction of a scale, the difficulty or quality of the specimens making up the scale must be accurately determined. This in itself is a complex and laborious procedure. If a diagnostic test or scale is being constructed, a thorough

survey of the types of difficulty or possible sources of weakness must be made, and test stimuli must be devised which will isolate and test these separately. If a rate test is being formulated, care must be taken to include test stimuli which are of equal merit or difficulty, so that the different units of the score may be uniform and comparable. Directions for giving and scoring must be worked out carefully, so as to produce standardization and insure that the tests will actually measure what is intended. Economical and convenient scoring devices must be devised. That the test or scale may be most useful, norms, calculated from the scores of a large number of representative classes, must be determined. All through the various stages of construction care must be taken to determine what items of the test contribute most and what least to the validity and reliability. No one should undertake to construct a standard test or scale who does not expect to be able to give a great deal of time to it, and who is not familiar with the technique of scientific test construction.

A number of good books describing the different tests and scales are now on the market, the more important of which are cited in section 1 of the references given at the close of this chapter, and from these teachers can easily ascertain the most desirable tests for use and how and where to obtain them.

2. Uses and values of standard tests for the classroom teacher

Tests have been put to use for many purposes. Designed principally for purposes of measurement, several other types of uses have since been made of them, and the kinds of measurements for which they have been used is manifold. The more important types of use to which standard tests have been put are:

1. In the surveys of schools and for other administrative purposes.
2. In the supervision of instruction and the rating of teachers.
3. In diagnosing weaknesses in learning.
4. In motivating instruction.
5. As a basis for school marks.
6. As instruments of measure for experimental purposes.

Administrative uses. Tests have until recently been used much more by administrators and supervisors than by teachers. In the many school surveys conducted since 1910, one of the most important phases has been that of measuring the quality of the instruction, and the status and achievement of the pupils in their various classes. For purposes of comparison with other schools, standard tests with norms were necessary. Almost any school survey report, printed during the past decade, contains one or more chapters describing the results obtained from the use of standard tests, in measuring the accomplishment of the pupils in the school system. School superintendents have since learned to conduct surveys of their own school systems, and to compare school with school and class with class.

Many superintendents and principals employ standard measuring instruments, for which the norms or the scores of other cities have been determined, as a basis for comparison, and find them an excellent means of demonstrating to the board of education and to the patrons and public the success of the school, or of certain phases of its work. Graphical representation of the degree of achievement found is quite useful for purposes of publicity through the superintendent's report or in the local newspapers.

One very satisfactory use of tests has been in the reclassification of pupils on the basis of their test scores. If but one type of test is to be used, school achievement tests are better for this purpose than intelligence tests. Pupils

have been found in the third grade whose achievement in the fundamental subjects exceeded the average of the fifth grade, and *vice versa*. Even in the high school such use may be made of school achievement tests. Pupils coming from outside schools may be classified in such subjects as Latin and modern languages by comparing their test scores with those of the various school classes in these subjects. A more common use is in the division of classes into sections, for the purpose of making better provision for individual differences. Here again achievement tests are more helpful than intelligence tests, though a combination of the two is better still.

Another administrative use of standard tests, and probably the most valuable use of them in the high school, is for prognosis or the prediction of ability to succeed in the various high school subjects. Much more attention is being paid to-day to educational and vocational guidance than formerly, because of the recognition of the importance of guiding high school pupils into subjects and vocations suited to their individual needs, abilities, and interests. Not many tests have as yet been devised which may be used for this purpose, and the widespread use of tests for this purpose waits upon the development of further tests. That others will be developed may confidently be expected.

Supervisory purposes. In the larger high schools, at least, heads of departments are at last beginning to realize their responsibilities as supervisors of instruction. The heads of departments upon whom the responsibility of supervision in the high school must fall, however, usually teach little short of full teaching load. While some class visiting may be done, what supervision they may do has to be done largely by means of advance planning of courses of study and methods of instruction, and by checking up by means of tests.

In many schools, heads of departments do this checking-up by using the ordinary examinations or tests considered in the previous chapter. In many instances instructors complain of such tests that they favor some teachers at the expense of others. It is hard to prove adequately that home-made tests do or do not do this. At any rate, the criticism cannot be made so readily with respect to standard tests, in the making of which no teacher in the school has had any part. In addition, the standard tests are very likely to be much more objective in the matter of scoring than any test constructed by the teaching force. By the use of a standard test it is also possible to make comparisons with other schools. The weakness of the standard test is the difficulty in finding a test which is well adapted to the specific outcomes for which the teachers have been working in a given school system. However, if a standard test be found which is essentially a diagnostic test, such a test is much more likely to be of service in bringing into relief the weak points than one hastily put together by the teacher or the department head.

Uses in rating teaching. Another use to which standard tests are put by some supervisors and administrative officials is the rating of teaching. The best measure of a teacher's efficiency is the progress of the class under his direction, in proportion to the ability of the class and to favorable opportunity for teaching. Standard tests may be given at the beginning and at the close of each semester, or year, and a measure of the progress of the class obtained by noting the difference between the two sets of scores.

However, it is rather generally recognized that other methods of teacher rating must be used along with the use of standard tests, or else teacher rating will be inaccurate. There are several reasons why it is difficult to rate the work of teachers by standard tests alone. In the first place, the

native ability of the class must be taken into consideration. Teachers teaching poor classes in poor sections of the city, or where attendance is irregular, or where the size of the class is unusually large, cannot be held for the same results as the teacher with a class of average or more than average ability, or where more favorable teaching conditions prevail. Then, too, it must be remembered that not all teaching outcomes are measured by standard tests and scales. The development of valuable ideals, interests, attitudes, general habits, skills, and concepts should be placed to the credit of the teacher; yet these are quite difficult to measure by tests or scales. Another limitation of this method of teacher rating is the "coachability" of many of the standard tests and scales.

Diagnostic testing. It is not advisable to stop short with disclosing weaknesses in a class or school; the important thing is that we find out just where and why the students are weak. It is very desirable to check up instruction from time to time and take inventory of what has been accomplished, to locate weak points, and to provide remedial instruction. Much of our teaching is just "shooting in the general direction." We need an intelligence corps to bring information regarding our hits and our misses, to help us locate the enemy, and to assist us in revising our aim.

Diagnostic tests are coming to be used with marked success in the elementary schools, but there is as yet no considerable supply of diagnostic tests for the high school subjects. Unlike the elementary school, there are many one-year courses in the high school. Diagnosis must be made in these courses at frequent intervals throughout the year. To wait until the end of the year will not serve. Standard tests for the high school which may be given at intervals during the year constitute a real need.

There are already available a few good diagnostic high

school tests, including the Douglass Diagnostic Tests for Algebra, the Minnick Geometry Tests, the Iowa Physics Tests, and the Godsey Diagnostic Latin Composition Test. There are certain others which have been devised for use in the elementary school, but which may be used to excellent advantage in the high school as well, and especially in the junior high school. Among these are the Charters Diagnostic Language and Grammar Tests, the Spencer Diagnostic Arithmetic Tests, the Monroe Diagnostic Tests in Arithmetic, the Fransen Diagnostic Tests in English, and the Freeman Chart for Diagnosing Faults in Handwriting.

When these tests are given, care should be taken to tabulate and study the results carefully, so that a detailed diagnosis is possible. This requires considerable time, but contributes much more to the progress of the class than the mere marking of many sets of papers for measurement only. As the technique of diagnostic testing will be considered in more detail in a later chapter on the Adjustment of Instruction to Individual Differences, further consideration of this use of tests is deferred until that chapter is reached.

Using standard tests for motivation. Students like to have goals toward which to aim in developing their abilities. They also like to be able to measure their progress in definite terms. The standard tests enable pupils to satisfy these desires, and, as a consequence, may contribute much to making school work more attractive and to challenging and arousing greater effort on the part of pupils. The ordinary school marks are likely to remain much the same for the student, from month to month or from quarter to quarter. This does not indicate progress to the student in any such way as may be done, in very graphic fashion, on the basis of increased scores on a standard test or scale.

Standard tests permit of objective measurement, so that competition between classes or schools is possible. What is still better, standard tests and scales permit the student to compete with his own record. The opportunities in this latter connection are unusually abundant in English composition, typewriting, shorthand, and other subjects where skill is the outcome to be tested. A system of monthly tests, employing standard tests and scales, is carried on in many elementary schools and in some high school classes, largely for the purpose of showing the pupil what progress he is making and thus motivating the work.

Standard tests as a basis for marks. We noted in the previous chapter the unreliability of teachers' marks in two connections — in the marking of papers, and in the distribution of marks. It is without doubt more reliable and scientific, besides being fairer, in those subjects where satisfactory tests exist, to base pupils' marks on objective tests than on subjective tests and marking systems. By satisfactory tests is meant tests which measure accurately the work for which the grade is given, and without an unreasonable expenditure of time and money. It is better to have an objective test which seems to measure the work covered only approximately than a subjective test which, while apparently constituting a good measure of the field desired to be measured, yields marks which depend upon who marks the paper. It must be remembered, too, that quite often the standard test and scale represents what the leading experts consider to be most important teaching elements in the subject, whereas the somewhat hurriedly devised subjective test may not conform to the recognized objectives of the course. The care taken in selecting the questions or other test-stimuli in the standard test must not be overlooked. The desirable range, sampling, and scaling are not easily attained by the busy teacher. Where standard

tests are not used, the objective type of written examinations described in the next chapter should be employed.

A method of turning test scores into school marks is not hard to devise. Where a distribution system is employed the test scores may be arranged in the order of magnitude, and then grouped into marks as described in the preceding chapter. In doing this it is advisable to assign the medium grade to students whose scores are close to the norms for the test, and then mark the others accordingly. By so doing, weak or strong classes will receive proportionally lower or higher marks, as they should.

Experimental investigation. One of the outcomes of the development of standard tests is the opportunity afforded for the substituting of accurate measurement for guesswork in measuring school achievement, so that some conclusions may be drawn as to the relative merits of methods of teaching, materials of courses of study, plans of school organization, and other debatable questions which are constantly the subject of opinion.

Students of education are already able to subject possible alternatives to an experimental test, and to evaluate each in an objective manner, in terms of comparable units of measurement. It will not be long now until we can say, with some assurance, whether students may be taught economically, in different subjects, in classes of thirty, or forty, or fifty; to what extent, if any, supervised study is superior to the traditional recitation in first-year algebra classes; or whether or not the socialized recitation and the project method tend to sacrifice thoroughness in detail in teaching. Scientific evidence and data on these questions, based on controlled experiments and in terms of objective, quantitative data, is already beginning to accumulate, and the next few years ought to make some definite conclusions possible as to these things.

3. *Using standard tests and scales*

Selecting tests to use. In selecting standard tests and scales for use in schools, much care can profitably be given to a consideration of certain criteria which need to be kept in mind. They are:

1. Purpose for which the tests are to be given.
2. The validity of the tests for the subject and purpose.
3. The reliability of the tests.
4. The objectivity of the tests.
5. The administrative economy of the tests.
 - a. Time necessary to give the tests.
 - b. Time necessary to score the tests.
 - c. Ease of learning how to give and score the tests.
 - d. Expense for the tests.
6. The question of usable norms.

We shall consider each of these criteria briefly, and in the above order.

The number of tests for use in high school and upper grade subjects is already so large and is growing so rapidly that it is impractical to attempt in this work a description even of the leading tests. Excellent descriptions of the leading tests may be found in the volumes listed at the close of this chapter, and many special subject tests also are referred to there. Progressive teachers should have at hand catalogues of tests issued by the firms and agencies distributing them, and books and magazines should be available in which detailed information about the tests may be found.

Purpose for which tests are to be given. Tests vary widely in their usefulness for different purposes. For example, the Holtz Algebra Scales constitute a very convenient device for measuring the results of instruction at the end of a year, or even at the end of a semester, but they should not be used for purposes of diagnosis or prognosis. Similarly, the Rugg-

Clark Tests for First-Year Algebra, and the Douglass Diagnostic Algebra Tests each require too much time and expense to permit them to be used economically for the purpose of mere measurement at the end of a year of work. For the purpose of prognosis, none of the above should be used; for this purpose the Rogers Tests of Mathematical ability are much more suitable. Again, the Douglass tests may be recommended for class diagnosis, but are hardly reliable for individual diagnosis unless followed by more detailed testing.

Different tests for the same subject, too, often test different outcomes of teaching, as, for example, in the Monroe Standard Research Tests in Algebra, and the Illinois Standardized Algebra Tests, the author proceeded on the thesis that, since problems in algebra are solved by means of the equation, the "fundamental operations" are those required in the solution of equations. Consequently these tests mentioned are to be recommended, both for purposes of survey and diagnosis, to those wishing to test the component abilities in solving simple equations.

For testing French classes the Henmon tests are excellent survey and measuring instruments, but for purposes of prognosis the Wilkins Prognosis Test, or the Handschin Test for Predetermining Ability in French, should be used. Similarly, if one wishes to test only information in history, there are a number of information tests, but there are few tests of appreciable diagnostic value. The Van Wagenen History Scales, and the Barr Diagnostic Tests for United States History, permit of rough diagnosis.

Since some tests test power, and others test rate and accuracy, when it is desired to test rate, care should be taken to obtain a rate test, and likewise if the degree of power is the thing of which measurement is to be taken, rate tests should not be employed.

Validity of the tests. Above all, one should know that the test actually tests what it purports to test, and that it tests what it is desired to test. Were it practical, teachers might profitably read the accounts of the derivations of the tests and scales being considered, and note what data is furnished going to show that the tests are "valid" for the thing they are supposed to test. This, though, requires too much time and technical ability to be generally recommended as a procedure.

There are several ways by which one may judge of the validity of a test. The simplest way is to examine the material of the test, and note whether it appears to constitute a good measuring instrument for the subject or function which it tests. Another is to compare the subject-matter of the test with studies or discussions of what are the objectives and essentials of the subject, and with studies of the relative social utility of the items within the course. For example, in selecting a test for algebra one would do well to examine the recommendations in the recent reports of the National Committee on Mathematical Requirements, and note what tests actually test the recommended subject-matter and its objectives. In other subjects the teacher would do well to examine that one of the reports of the Commission on the Reorganization of Secondary Education which has to do with the subject in question.

The most reliable method of determining the validity of a test, however, is by discovering its correlation with a known valid criterion. For example, MacQuarrie, in the construction of his tests for mechanical ability, gave all the preliminary test material to a large number of people whose respective mechanical abilities were rather well determined. He found that some items were as well done by those of low mechanical ability as by those of high mechanical ability, while others were done better and better as one went from

those of lesser known ability up the scale to those of highest known ability. The first class of items he then discarded as having little validity; the latter type he retained. By so doing he was able to construct a valid test. Tests and scales should correlate not less than .60 or .65 with a reliable outside criterion; tests which correlate less than .40 or .45 are as likely to be measures of something else as they are of the thing the test purports to measure.

Teachers should satisfy themselves that tests are valid. The better textbooks on educational tests and measurements now give figures as to the statistical validity of the tests they describe and recommend for use. Some publishers of standard tests also furnish such figures with the tests.

Reliability of the tests. By reliability is meant the degree to which the measuring instrument gives a constant score for a constant degree of that which it measures. When one uses a footrule to measure the width of a window, barring gross error on the part of the person doing the measuring, one always gets approximately the same reading, no matter how many times he applies the rule. It should be so with school achievement tests. However, tests are not equal in the ability to call forth from the student consistent responses. On some tests a pupil's score will vary appreciably from one testing to another, and for no apparent reason.

The reliability of a test is best measured by statistical means. If there are two similar forms of a test of equal difficulty, item by item, a measure of its reliability is the correlation between the standings of a group of pupils to whom the two forms of the test have been given, without any intervening instruction or other happenings likely to cause pupils to do better or worse on the second testing. If but one form of the test exists, the correlation of two similar halves may be used as a measure of reliability.

It is hard to say just how large the coefficient of correlation

should be. The reliability coefficients of certain well-known standard tests and scales have been collected and published in tabular form by Monroe and Souders. These ranged from .19 in the case of one test for silent reading to .92 for the Illinois General Intelligence Scales. The median of the twenty-one coefficients given was .75, and the middle half ranged from .59 to .84. The reliability of ordinary examinations varies all the way from practically zero to better than .90, though in the very large majority of instances it falls between .45 and .75. The median of reliability of 66 pairs of similar examinations, as calculated by Monroe and Souders, was .65. A reliability coefficient depends upon a number of factors. When based on the performances of unselected children of a single grade, they are rarely found over .90. Tests having reliability coefficients over .80 for a single grade may be used with great confidence. When the reliability is below .60, two forms of the test should be combined in order to get reliable scores. In general, tests having reliability of less than .40 for a single grade, or .50 for a range of three grades, are hardly worthy of use. Reliability coefficients based on the performance of children in more than one grade should be higher than those based on the performance of children of one grade only. Like measures of validity, measures of reliability should be furnished with the description of tests, and should be noted by prospective users.

Objectivity of the tests. One of the essential characteristics and points of superiority of standard tests is the degree of uniformity with which different teachers may score the test papers. This characteristic of a test is its objectivity. Some tests are so devised that it makes no difference who scores the test; barring mischance the score will be the same.

As yet no statistical means is being used to measure the

objectivity of the test. Everything else being equal, tests which permit of no disagreement between scores are much to be preferred. Where the personal element enters in, or where it is difficult to evaluate the answers to a test, the test can hardly be used safely. Usually this quality of a test may be judged by inspection.

Administrative economy. The time required for the pupil to take the test must also be considered, as must, of course, the time required to score it. Some tests are so constructed that all the pupil has to do is to write a single word, at the side of the question and in a place provided there — as “yes,” “no,” “true,” or “false.”

Various devices are employed to keep at a minimum the amount of time necessary to score the tests. One form is answer strips which may be placed edge to edge with the test paper, so that the correct answer may be close to the pupil's answers and easily seen. Another form is the cardboard answer key with apertures which, when the key is superimposed on the test paper, fit directly over the spaces provided for the pupil's answers, thus enabling the scorer to compare the answers on the pupil's test papers with the answers printed at the edge of the openings. In many instances tests requiring forty minutes to complete may be scored at the rate of one or more a minute.

A few tests require considerable skill and preparation for scoring. These should not unduly discourage teachers as the technique of these may be mastered easily, and in subsequent use of the scale this preliminary preparation will not be necessary. One such test is the Van Wagenen Scale for American History, which otherwise is one of the better measuring instruments.

There is a wide variation in the price of the tests, varying much with the nature of the subject and the length and character of the test. A few copies of the Thorndike Scale

for Handwriting, costing but twelve cents each, will serve a school for years, as will a few copies of composition scales. On the other hand, where the test requires that one copy be provided each student each time he takes the test, the cost often runs to as much as eight or nine dollars per hundred. Many of the most valuable tests and scales, however, are to be obtained at from fifty cents to two or three dollars per hundred.

The question of usable norms. For some purposes it is desirable, even if not necessary, to select scales or tests with adequate norms. Also, one may often wish to give tests at such times that the test results may be directly comparable. If one wishes to compare a class or a school with what is being accomplished generally, in similar classes, one must use a test with norms. Norms should be based upon results with at least a thousand or more unselected pupils in various types of schools, communities, and sections of the country. For some tests one should ascertain to what time of the school year the norms correspond. For example, one may not compare a second-semester class in March with the norms for June, or vice versa. Ordinarily, of tests equally desirable in other respects, even where no such comparison is contemplated, it is better to select those for which there are norms. Uses may arise later for the data so obtained which call for the use of norms.

Administering standard tests. One ought to plan the giving of tests some time ahead. To this end, teachers should have in their possession copies of the catalogues of test-distributing firms or agencies. Sample copies of several tests should be obtained and studied with respect to their appropriateness for the purpose for which the testing is to be done. It is often a good plan to write to the bureau of educational research connected with the school of education of the state university, setting forth the purpose

of the testing and asking recommendations as to tests to use. Books on educational measurement, such as those by Hines or Monroe, often give such advice.

The directions for giving the tests should be gone over in detail and thought through, so that they may be carried out without hitch or mishap. In giving the tests, directions should be followed to the letter. No deviation should be made, no matter what the apparent need for doing so. All needed explanations are carefully provided for in the instructions; if these are not followed meticulously, the test results are likely to be of little value.

Scoring standard tests. Before starting to score a set of standard test papers, or a set of specimens by a quality scale, the instructions should be read carefully. These should be followed to the letter. In tests which are absolutely objective the scoring may be done by the pupils. Papers scored by pupils should be rescored once more, after exchanging test papers. Even when this is done it is well for the teacher to score a few papers to determine whether the scoring has been accurately done. It should be borne in mind, though, that by permitting the pupils to score the test papers the instructor fails to take advantage of an excellent opportunity to analyze the exact nature and causes of the weaknesses of individuals in the class.

In certain types of tests and scales, scoring by the pupils is not practical. The scoring of tests where the scoring is complex and difficult, such as in the Van Wagenen History Scales, requires training and maturity. In the case of quality scales it is not only desirable to have the scoring done by the teacher, but the teacher should spend some time in practice with such scales before beginning to use them for practical purposes.

Most tests provide forms and directions for the tabulation and organization of test data. These vary from test to test.

Much of the value of giving standard tests depends upon utilizing these tabulatory and graphical forms.

Dangers and limitations. There are certain limitations of standard tests and scales which must not be overlooked by those using them. These may be stated briefly, as follows:

1. They do not always measure all the important outcomes of teaching. They are much better adapted to the measurement of information and intellectual skills than they are to the measurement of ideals, attitudes, interests, and the more subtle and yet equally or even more important outcomes of teaching.

2. They are not completely free from inaccuracy as a means of measurement. Very few high school tests are more than .80 reliable, and many of them fall below .70. They are not in all cases completely objective. For many purposes it is necessary to use data of another nature. For example, in the classification of pupils, the rating of teachers, or determining whether a pupil should be urged to apply himself more industriously, supplemental data on intelligence is desirable.

3. Standard tests occasionally lead to the unwise emphasis of certain objectives in teaching. If pupils or teachers come to realize that their work is to be gauged by those over them by the results of standard tests, it is only natural that they should direct their best efforts toward the end of producing a good showing in the testing. In this manner the materials of the standard tests and scales to be used — in which in many instances some types of educational outcomes, because of the relative ease with which they may be measured, are emphasized out of proportion to their importance — become the educational objectives.

4. It has also been pointed out that tests and scales are based upon present practice as regards courses of study and teaching methods. Should the work of the school, the

pupil, and the teacher be measured too closely by such, that fact may tend to restrict progress and initiative in matters of content and methods because of the possibility of lowering the test scores.

5. Norms should not be regarded as educational objectives for the individual student. He should not be encouraged to conceive of the norm as an aim. Many students should be urged to excel the norm by a wide margin, while others less gifted may not hope to attain the norm, and any great amount of extra instruction or urging is wasted. The fact of individual differences must not be lost sight of. In determining the level to which any given pupil should be expected to attain, one must not only have in mind the norm but also the range of scores around the norm, the relative intelligence of the given individual, and, if possible, some measure of the relative ability of the pupil in the given subject. If the pupil in question seems to be gifted with superior powers of intelligence and general ability, or with special ability in the subject, he should be expected to exceed the norm. Similarly, as he falls below the normal intelligence of young people of his school year, or normal ability in the subject, it is reasonable to set for him a lower standard than that of the norm. In order that teachers may intelligently interpret standard test scores in terms of norms, many school officials are supplying teachers with data as to the intelligence of their pupils, in terms of I.Q.'s (intelligence quotients).

6. Many unfortunate and erroneous conclusions are drawn from test results which have been due to inexpertness or carelessness in giving the tests. Lincoln, in his *Beginnings in Educational Measurement*, cites an example of a teacher who called attention to critical letters in spelling words in such a manner that standard test conditions did not obtain, and the resulting test scores were valueless.

4. Statistical interpretation of test results

There is a certain minimum knowledge of statistical terms and methods which teachers should know, and which are useful in organizing and interpreting test results. Among the things most useful which a teacher should be able to do are:

1. To construct a frequency tabulation, and to construct a graph representing it.
2. To calculate the mean, median, and mode of a frequency tabulation.
3. To calculate certain measures of range and dispersion, such as the quartiles and the standard deviation.
4. To calculate a simple correlation coefficient.

A very brief and quite elementary consideration of the first three of the above will be presented here, though the reader should be warned that the discussion of statistical method given is quite abbreviated. Those having access to satisfactory references such as are listed at the close of the chapter should consult them for accurate and detailed treatments. Rugg's *Primer of Graphics and Statistics for Teachers* will be found especially helpful.

A frequency distribution. Below will be found two frequency tabulations, and a graph of one. Any teacher

TEST SCORES MADE BY PUPILS ON A SIX WEEKS' TEST IN HISTORY

TEST SCORE	NO. OF PUPILS
46-50	1
41-45	0
36-40	3
31-35	5
26-30	9
21-25	7
16-20	5
11-15	2
6-10	0
	32

NUMBER OF FACTORING PROBLEMS SOLVED CORRECTLY BY
137 PUPILS IN FIRST-YEAR ALGEBRA

NO. OF PROBLEMS	NO. OF PUPILS
13	1
12	3
11	8
10	14
9	29
8	35
7	21
6	16
5	5
4	3
3	1
2	1
	137

should be able to construct a frequency tabulation from a set of test scores similar to these. Grouping should be employed, as is done in one tabulation below, if the range of scores is more than 15 or 16 units on the scale. Grouping should be done so as to result in from 9 or 10 to 15 or 16 equal intervals.

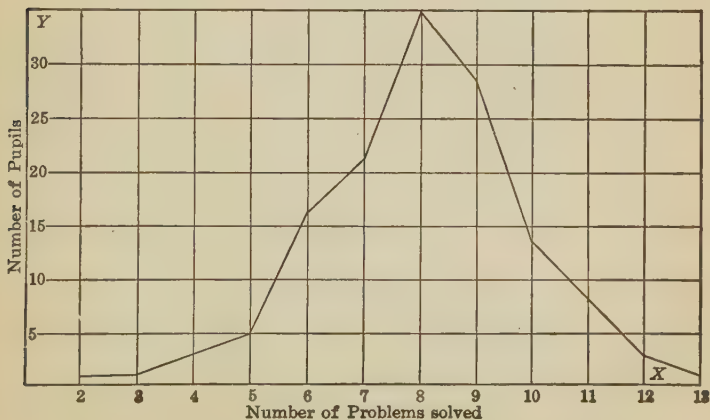


FIG. 2

Measures of central tendency. It is often desirable to know what the average score of a group of pupils is. It is quite common to use the average as a measure of ability of the group. We say, "The average high school pupil can do that well." There are three commonly used kinds of averages — the mean, the median, and the mode.

The mean is what we ordinarily call the average, namely, the total of the scores divided by the number. It is sometimes termed the arithmetical average.

The mode is the score made by the largest number of pupils.

The median is the score of the pupil better than whom and poorer than whom there is just one half of the class. Very frequently we find the median pupil is one of a number making the same score. Where this is true, we use the following method to find the median:

SCORE	NUMBER
96-100	1
91-95	2
86-90	4
81-85	7
76-80	9
71-75	6
66-70	3
61-65	0
56-60	2
51-55	0
	34 = N
	$\frac{N}{2} = 17$
	$17 - 14 = 3$
	$\frac{3}{9} \text{ of } 5 = \frac{15}{9} = 1.67$
	$80.5 - 1.67 = 78.83$

Counting in from the top we find the seventeenth pupil in the group scoring between 75 and 81. Down to that group we count 14. The median is then the third pupil within the 76-80 group. On the theory that these 9 pupils are scattered evenly along the scale, the third pupil is three ninths of the way from 80.5 to 75.5, the two boundaries of the group. As calculated above, this is found to be 78.83. This latter process is called "interpolation." It is always wise to check statistical calculations. In checking the calculation of the median it is good practice to begin from the bottom and count up. The result should be the same. In large groups the mean and the median will be very close together, unless a large number of high or low scores are found in the scale.

Measures of range and dispersion. It is often useful to know not only what the average performance or ability of a group is, but to what extent they are uniform, or what is the dispersal in ability. The range of a distribution is the difference between the highest and the lowest scores. Dispersion can be shown in several other ways. One method is by comparing the upper and lower quartiles with the mean or median. The upper quartile is found in the same manner as is the mean, with the exception that one counts in from the top one fourth of the number of cases instead of one half. The lower quartile is found by counting in one fourth from the bottom. Interpolation is used, as in the case of the median.

Another measure of dispersion worth knowing is the "standard deviation." To find this measure it is necessary to:

1. Find the difference between each test score and the mean of all of them, and square it. (Where a number of scores are the same or in the same group, as 46-50, the difference of the middle of the group, here 48, and the mean may be squared and multiplied by the number of scores to save time.)

2. Extract the square root of the sum of the squares so obtained.
3. Divide this square root by the number of scores.

In any elementary book on statistical methods, or on tests and measurements, a description of a short method of computing the median and illustrated by concrete examples will be found.

Measures of relationship. Suppose that you had the test scores of a large number of pupils in algebra and the test scores of the same pupils in typewriting, how would you measure to what degree ability in typewriting went with ability in algebra? The most commonly used method is that of simple correlation by the Pearson product-moment formula.

It is quite easy to learn how to calculate a coefficient of correlation. The method, with examples, is given in a number of books on statistical methods, or on educational tests and measurements, such as are listed under the references given at the close of this chapter. To describe the method satisfactorily would require more space than is available here.

QUESTIONS AND EXERCISES

1. Can you recall any instances of teachers, principals, or superintendents being judged on the basis of things other than the results of their school work?
2. In what respect is a prognostic test essentially different from a diagnostic or a survey test?
3. In what respects is the usual written examination different from a standard test or scale? Make a list of these.
4. In what particular respect is a diagnostic test essentially different from a survey test?
5. What advantages result from using standard test scores in determining the standing of students in their courses?
6. Write out a definition in your own words of the following terms — norm, validity, reliability, objectivity.
7. If such are available, examine two or three standard tests or scales in some one high school subject, and decide what each tests, and what

relative emphasis is given to testing information, skills, attitudes, or ideals. Be prepared to justify your answer with specific proof.

8. Compare these tests, so far as you can, as to validity, reliability, objectivity, and administrative economy.
9. If no data is given on the validity of a test, how can one judge of its validity?
10. Make a list of possible objections to the use of standard tests. Determine which may be avoided by a proper use of tests, which are not valid objections, and how serious the others are.
11. Construct a frequency tabulation and determine the mean, mode, median, lower quartile, upper quartile, and standard deviation of the following scores, made on a written test:
98, 90, 94, 63, 88, 93, 87, 90, 45, 75, 86, 75, 86, 73, 78, 87, 83, 78, 72, 84, 85, 86, 92, 59, 84, 85, 83, 74, 96.

SELECTED REFERENCES

I. General, on use of tests

Douglass, H. R. "Some Uses and Limitations of Educational Tests and Measurements"; in *Educational Administration and Supervision*, vol. 5, pp. 475-90. (December, 1919.)

Foster, Herbert H. *Principles of Teaching in Secondary Education*. New York: Chas. Scribner's Sons, 1921.

Chapter XIV, pp. 271-92, contains a discussion of scales and tests for high school subjects.

Gilliland, A. R., and Jordan, R. H. *Educational Measurements and the Classroom Teacher*. New York: Century Co., 1924.

Chapters I-IV give a single discussion of the uses and technique of giving tests. Chapters XIII-XV describe a number of tests for high school subjects.

Gray, W. S. "The Use of Tests in Improving Instruction"; in *Elementary School Journal*, vol. 9, pp. 121-41. (October, 1918.)

Discussion of diagnostic uses of tests, based on a study made in the elementary school of the University of Chicago.

Gregory, C. A. *Fundamentals of Educational Measurement*. New York: D. Appleton & Co., 1922. Pp. xi + 392.

Several chapters on general theory values and uses of standard tests. Simple discussion of statistical terms and methods.

Hines, Harlan C. *A Guide to Educational Measurements*. Boston: Houghton Mifflin Co., 1923.

Part III, Chapters XXIII-XXVIII. Short chapters giving brief descriptions of several selected tests for each of the high school subjects. Bibliography for each subject.

Holley, C. E. *The Teacher's Technique*. New York: The Century Co., 1922.

Chapter XV, Tests and Standards.

McCall, Wm. A. *How to Measure in Education*. The Macmillan Co., 1922.

Part I, "How to Use Measurement." Especially Chapters I, III, IV, and V for teachers.

Mead, Arthur R. *Learning and Teaching*. Philadelphia: G. B. Lipincott Co., 1923.

Chapter IX, "Measurement of Mental Functions."

Mensencamp, L. A. "Tests of Mathematical Ability and their Prognostic Values: a Discussion of the Rogers Tests"; in *School Science and Mathematics*, vol. 21, pp. 150-62. (February, 1921.)

A clear description and explanation of the Rogers Tests of Mathematical Ability.

Monroe, W. S. *Theory of Educational Measurement*. Boston: Houghton Mifflin Co., 1923.

Chapter II, "Nature and Process of Educational Measurements." Chapter III, "Uses of Educational Measurements in the Work of the School." Chapter IV, "The Construction of Educational Tests." Chapter V, "Using Standardized Educational Tests."

Monroe, W. S., De Voss, J. C., and Kelly, F. J. *Educational Tests and Measurements*. 2d Revised and Enlarged Edition. Boston: Houghton Mifflin Co., 1924.

Probably our most useful book on tests and measurements. Contains good descriptions of the more important tests.

Rugg, H. O. *Primer of Graphics and Statistics for Teachers*. Boston: Houghton Mifflin Co., 1925.

A very valuable elementary treatise on the use of graphic representation and statistical procedures.

Trabue, M. R. *Measuring Results in Education*. New York: American Book Co., 1924.

Chapters I, II, and III constitute a general discussion of the nature, need for, and development of standard tests.

Wilson, G. M., and Hoke, K. J. *How to Measure*. New York: The Macmillan Co., 1920.

Chapter I, "The New Attitude Toward Measurement." Chapter IX, "The Measurement of High School Subjects." Bibliography. Chapter XI, "Statistical Terms and Methods." Chapter XII, "The Teachers' Use of Scales and Standardized Tests."

2. Special Subjects

Branom, M. E., and Fred K. *The Teaching of Geography*. New York: Ginn & Co., 1921.

Chapter XXI, "Measuring Results." Discussion of uses of standard geography tests, with scales and descriptions of some of the tests.

Briggs, Thomas H. "English Composition Scales in Use"; in *Teachers College Record*, vol. 23, pp. 423-52. (November, 1922.)

Briggs, T. H., and Kelley, T. L. "Sixteen Spelling Scales"; in *Teachers College Record*, vol. 21, pp. 337-91. (September, 1920.)

Brown, H. A. *Latin in Secondary Schools*. Oshkosh, Wisconsin, State Normal School, 1919. 170 pp.

Camp, Harold L. "Scales for Measuring Results of Physics Teaching"; in *Journal of Educational Research*, vol. 45, pp. 400-05. (May, 1922.) Also in *School Science and Mathematics*, vol. 23, pp. 441-46. (May, 1924.)

Certain, C. C. "The Briggs Form Test in Use"; in *English Journal*, vol. 12, pp. 244-57. (May, 1923.)

Describes the practice use of the Briggs Form Test for English in a Detroit high school.

Chapman, J. Crosby. "The Measurement of the Physics Information"; in *School Review*, vol. 27, pp. 748-62. (December, 1919.)

Cook, William A. "An Effort to Measure Typing Efficiency"; in *Journal of Educational Research*, vol. 11, pp. 49-59. (January, 1925.)

Describes a test for typing, gives directions for use and norms.

Courtis, S. A. "The Measurement of High School Mathematics"; in *School Science and Mathematics*, vol. 18, pp. 507-26. (June, 1918.)

Douglass, Harl R. *The Douglass Standard Tests for Measuring Achievement in First Year Algebra*. Revision and Extension. University of Oregon Publications, vol. 2, no. 5. (June, 1924.)

An account of the revision and extension of the Douglass Algebra Tests including a copy of tests, directions for giving and scoring, name and record sheets.

Douglass, Harl R. "A Series of Standardized Diagnostic Tests in the Fundamentals of First Year Algebra"; in *Journal of Educational Research*, vol. 4, pp. 396-403. (December, 1921.)

Douglass, Harl R. "Measuring Achievement in First Year Algebra"; in *The Mathematics Teacher*, vol. 16, pp. 414-20. (November, 1923.)

A brief description of the revised Douglass Tests for Algebra.

Downing, E. R. "A Range of Information Tests in Science"; in *School Science and Mathematics*, vol. 19, pp. 228-33. (March, 1919.)

Gerry, H. L. "Measuring and Results of the Teaching of Chemistry"; in *School Science and Mathematics*, vol. 24, pp. 793-804. (November, 1924.)

- Glenn, G. R. "The Conventional Examination in Chemistry and Physics vs. New Types"; in *School Science and Mathematics*, vol. 21, pp. 746-56. (November, 1921.)
- Gregory, C. A., and Spencer, P. L. "A Geography Test for the Sixth, Seventh, and Eighth Grades"; in *School and Society*, vol. 15, pp. 452-56. (April 22, 1922.)
- Gronert, Mary Lynch. "A Prognostic Test in Typewriting"; in *Journal of Educational Psychology*, vol. 16, pp. 182-85. (March, 1925.)
An account of the use of tests for predicting success in typewriting and a summary of results.
- Handschin, C. H. "A Test for Discovering Types of Learners in Language Study"; in *Modern Language Journal*, vol. 3, pp. 1-4. (October, 1914.)
- Harlan, Charles L. "Educational Measurements in the Field of History"; in *Journal of Educational Research*, vol. 2, pp. 849-53. (December, 1910.)
- Henmon, V. A. C. "The Measurement of Ability in Latin: Part I, Vocabulary, Part II, Sentence Tests, Part III, Vocabulary and Sentence Tests"; in *Journal of Educational Psychology*, vol. 8, pp. 515-38, 588-99; vol. 11, pp. 131-36. (November, December, 1917; March, 1920.)
- Hobson, E. G. "Observations on Two Latin Vocabulary Tests"; in *School Review*, vol. 28, pp. 509-17. (September, 1920.)
- Hotz, Henry G. *First Year Algebra Scales*. Teachers College Contributions to Education, no. 90, Columbia University, 1918.
- Hudelson, Earl. "English Composition. Its Aims, Methods, and Measurements"; in Part I of *Twenty-Second Yearbook of the National Society for the Study of Education*, 1921.
- King, Florence B. "A Measuring Scale in Foods"; in *Indiana University Extension Division Bulletin*, vol. 7, no. 10, pp. 144-46. Bloomington: University of Indiana, 1922.
- Lackey, E. E. "Measuring the Ability of Children in Geography"; in *Journal of Geography*, vol. 16, pp. 184-88. (1918.)
- Minnich, J. H. "A Scale for Measuring Pupils' Ability to Demonstrate Geometrical Theorems"; in *School Review*, vol. 27, pp. 101-09. (February, 1919.)
- Monroe, Walter S. "A Test of the Attainment of First Year High School Students in Algebra"; in *School Review*, vol. 23, pp. 159-71. (March, 1915.)

Monroe, W. S. *Educational Tests and Measurements*. Boston: Houghton Mifflin Co., 2d Revised and Enlarged Edition, 1924.

Chapters III, II, IV, and V on tests on Arithmetic, Reading, Spelling, and Handwriting respectively; Chapter VIII, High School Tests; Chapter VI, English; and Chapter VII, Geography and History.

Murdock, Katherine. "A New Analytic Sewing Scale"; in *Teachers College Record*, vol. 23, pp. 453-58. (November, 1922.)

Ruch, G. M. "A Range of Information Tests in General Science"; in *General Science Quarterly*, vol. 4, pp. 257-62. (November, 1919.) Also vol. 5, pp. 15-19. (November, 1920.)

Ruch, G. M. "Tests and Measurements in High School Subjects"; in *School Science and Mathematics*, vol. 23, pp. 885-91. (December, 1923.)

Gives list and brief description of tests, and where to get them.

Rugg, H. O., and Clark, J. R. "Standardized Tests and Improvement of Teaching in First Year Algebra"; in *School Review*, vol. 25, pp. 113-32; 196-213; 346-49. (February, March, April, 1917.)

Rugg, H. O. "A Scale for Measuring Free-Hand Lettering"; in *Journal of Educational Psychology*, vol. 6, pp. 25-42. (January, 1915.)

Seashore, Carl E. "Measurement of Musical Talent"; in *Musical Quarterly*, vol. 1, pp. 129-48. (January, 1915.)

Starch, Daniel. "A Test in Latin"; in *Journal of Educational Psychology*, vol. 10, pp. 489-500. (December, 1919.)

Trilling, Mabel B., and Hess, Adah. "Informal Tests in Teaching Textiles and Clothing"; in *Journal of Home Economics*, vol. 13, pp. 483-89. (October, 1921.)

Trilling, Mabel B., and others. *Supplementary Educational Monographs*, vol. 2, no. 6, pp. 75-114. University of Chicago, 1920.

Chapter VII, "Measuring the Results of Teaching in Textiles, Dress Design, Sewing and House Planning." Chapter VIII, "Scales for Measuring Skill in Machine Sewing."

Ullman, B. L., and Kirby, F. J. "Latin Comprehension Test"; in *Journal of Educational Research*, vol. 10, pp. 308-17. (November, 1924.)

Williams, Lewis W. "Illinois Standardized Algebra Test"; in *Journal of Educational Research*, vol. 3, pp. 75-76. (January, 1921.)

3. Leading distributing agencies for tests and scales

Bureau of Administrative Research, University of Cincinnati, Cincinnati, Ohio. Also same at State University of Ohio, at Columbus, Ohio.

Bureau of Publications, Teachers College, Columbia University, New York City.

Extension Division, University of Iowa, Iowa City, Iowa.

Bureau of Educational Measurements and Standards, Kansas State Teachers College, Emporia, Kansas.

Public School Publishing Co., Bloomington, Illinois.

World Book Co., Yonkers, New York.

J. K. Gill and Co., Portland, Oregon.

CHAPTER XIV

NEW IDEAS IN WRITTEN EXAMINATIONS

1. *New types of written examinations:* Need for objective and reliable tests — New types of objective examinations — The simple statement, or enumeration exercise — The completion exercise — The true-false exercise — The multiple-response exercise — The best-answer type of exercise — The matching exercise.
2. *Advantages of these types of tests:* Criteria — Increased reliability — Greater objectivity — Administrative economy; time saved in giving — Time saved in scoring — Comparative merit of types of objective examinations — Their relative reliability — Their relative objectivity — Their economy of administration.
3. *Objections to and shortcomings of the new examinations:* Five objections commonly made — They do not measure the important outcomes of teaching — They require time and money to prepare — They encourage dishonesty — Students object to the tests — Do not provide training in organization and expression.
4. *The technique of the objective examination:* Procedure in construction — Suggestions on the framing of true-false and multiple-choice exercises — Suggestions for giving objective tests — Scoring objective examinations.

Questions and exercises — Selected references.

1. *New types of written examinations*

Need for objective and reliable tests. One of the outcomes of the development of standard tests and scales has been the development of the technique of devising objective and reliable measuring instruments. Except in the case of quality scales, it makes very little difference who scores the papers if a standard test or scale is used. Marks assigned by different persons to a given paper will vary insignificantly. The scoring has been made "fool proof," and care has been taken to prevent the variable human element from entering into the scoring. Many of the tests, even, do not necessitate the services of a teacher or a trained scorer; they may be scored by clerks or by children.

It was noted in a previous chapter that among the most serious objections to written examinations, as they are commonly administered, are:

1. That they are not objective.
2. That they are not reliable.
3. That they require too much time to give and score.

On all three points the standard test is superior to the ordinary written examination. Standard tests and scales are much more objective, too, than are written examinations. No variation, such as characterize the marks assigned papers by different teachers, in all studies made of teachers' marks, is possible where a standard test is used. Secondly, the reliability of a standard test — the tendency to yield the same score for the same or equal amounts of ability — has been shown to be greater than the reliability of ordinary examinations. In the third place, standard tests and scales in most instances require much less time for scoring.

However, needs for tests arise for which standard tests and scales are not suitable. Being derived for schools in general, regardless of variations in courses of study, they do not always serve to measure just the material which the teacher upon occasion wishes to test. Then, too, they are more expensive than ordinary written examinations.

It is only logical to expect that the technique of their construction and use — the underlying principles and devices which have operated to produce objectivity, reliability, and economy of time in standard tests — should be employed by progressive teachers in the making of their own non-standard written examinations. That is exactly what has happened. Teachers in colleges and high schools are to-day employing types of tests and principles of test-construction which heretofore have been confined largely to those who were devising standard tests and scales.

New types of objective examinations. The new types of objective examinations which, as a result, have been created are of two general types: (1) those in which the activity stimulated on the part of the pupil is the recall of experience, or the statement of an opinion, judgment, or attitude; and (2) those in which the activity stimulated is recognition or the identification, from a number of possible given answers or responses, of the one which is thought to be correct, or that one which best expresses the opinion, judgment, or attitude of the pupil.

Of the first type there are several distinct varieties, as simple recall questions, enumeration and simple statement exercises on the one hand, and completion exercises on the other. Illustrative of the second type are: the true-false, or yes-no exercise; the matching exercise; and the multiple-response, or best-answer exercise. We shall consider each of these types and varieties, giving a brief description of each.

The simple statement, or enumeration exercise. The simple statement exercise resembles the traditional examination question more closely than any other of the new types of examination. Below is an example of such an examination, only a portion of the test being here reproduced.

AMERICAN HISTORY

Write, in the blanks provided below, the words or phrases called for in the various exercises:

1. The date of the discovery of America
2. The last names of the first three presidents of the United States, in order:
 1. 2. 3.
3. Cabinet officers selected by Lincoln in 1860 were:

Secretary of State.....	Secretary of War.....
Secretary of Treasury.....	Attorney-General.....

4. Three reasons why the French assisted the United States in the War of the Revolution:
 1.
 2.
 3.
5. Name four important cities established in America by the French.
 1. 3.
 2. 4.
6. The names of three Union generals.
 1. 2. 3.
7. The name of the inventor of the cotton gin.
.....
8. The chief provisions of the Missouri Compromise.
.....
.....
9. The significance of the name Harriet Beecher Stowe.
.....
10. Three candidates for president of the United States in 1860, and their party and position on slavery.

<i>Candidate</i>	<i>Party</i>	<i>Position on slavery</i>
1.		
2.		
3.		

This type of examination has one prominent advantage as compared with other types of objective examinations, in that it tends to keep guesswork at a minimum. That this is true will be apparent after an inspection of the other types. At the same time, because of the brevity and definiteness of the answers, it may be scored easily and quite rapidly.

The completion exercise. Below is reproduced an example of the completion type of examination, as given by W. S. Monroe in his excellent monograph on *Written Examinations and their Improvement*. (University of Illi-

nois.) Only five of the twenty-four statements of the examination are reproduced here.

AMERICAN GOVERNMENT

Below you will find a number of statements. In each statement one or more important words have been omitted. Each blank in the sentence shows where a word has been left out. Read each statement carefully; then write in the blank the word which completes the meaning of the statement. You will be allowed fifteen minutes for the test.

1. The primary purpose for which government exists is the of our lives and property.
2. Citizenship may be acquired by in this country or by a process of for natives of other lands.
3. Our National Government derives its authority from the of the United States through our National
4. The legislative power granted to the National Government is vested in a Congress of houses, the smaller of which is called the and the larger the
5. The execution of the laws made by is intrusted to the of the United States.

The completion exercise possesses the advantages common to all objective examinations. It also possesses the peculiar quality of the recall type of exercise, namely, that the power to recall the correct answer is tested, as well as the ability to recognize the correct response and to distinguish it from others. It possesses the peculiar shortcoming, though, that it places a premium upon the ability to form rote or verbal associations. Also, unless the exercises making up the test are chosen quite skillfully, they are likely to be somewhat indefinite, permit of more than one correct answer, or furnish insufficient data to stimulate the pupil to the correct response, even if he should know it.

These pitfalls should be kept in mind when a completion examination is being constructed.

The true-false exercise. The true-false exercise consists of a number of statements, the truth of which the student is asked to affirm or deny. Below is a portion of such an examination, taken from one consisting of fifty items, as given by Ruch in his *Improvement of the Written Examination*.

TRUE-FALSE TEST IN FIRST YEAR LATIN¹

1. Insulae multas formas habent.	True	False
2. Romani servos non habebant.	True	False
3. Equi carros trahunt.	True	False
4. Romani multas vias bonas muniebant.	True	False
5. Vera amicitia est grata.	True	False
6. Multi vitam in bello amiserunt.	True	False
7. Pueri Romani semper laborant et ludos non habebant.	True	False
8. Filii agricolarum multa de agris et noverunt	True	False
9. Silvae nostrae conservari debent.	True	False
10. Multi pueri, qui in Europa habitant studia ob bellum intermiserunt.	True	False

Below is a portion of another form of such an examination devised by Dr. M. T. Carpenter, of the University of Iowa High School, for the testing of progress in literature. The complete examination consists of forty-two items.

EXAMINATION ON MACBETH

1. Yes No Macbeth thought of murder after hearing the witches.
2. Yes No Macbeth was for a while a possible heir to the throne.
3. Yes No Macbeth smeared the guards' faces with blood.
4. Yes No Duncan's sons were suspected because of their action.
5. Yes No Fleance was killed along with Banquo.

¹ Quoted by permission of Scott, Foresman & Co., publishers.

6. Yes No Banquo suspected Macbeth of the murder.
7. Yes No The witches said that Macbeth could not be conquered.
8. Yes No Malcolm suspected Macduff of treachery.
9. Yes No The thanes stood by Macbeth.
10. Yes No The prophecy was broken when Macbeth was killed.

The multiple-response exercise. Among the most commonly used of all types of objective examinations is the multiple-response, or best-answer exercise. The task is to select, from three or more possible answers, the correct one, or the best answer to the question or problem stated. The exercises given below constitute a portion of a General Science Scale, arranged by August Dvorak. The complete test consisted of sixty items.

GENERAL SCIENCE SCALE¹

Group I. Form R-I (Average value 61.5)

Underline the one of the five parts in each of the statements on the following pages which will make the statement most true.

1. A bright, blue sky indicates bad, fair, rainy, stormy, gloomy weather.
2. A house fly is harmful because it has a poisonous bite, carries bacteria, destroys food, is hard to strike, destroys crops.
3. Balloons float in the air because of their lightness, shining color, engines, baskets, size.
4. The best way to make impure water safe is to let it settle, boil it, freeze it, use chemicals, do nothing.
5. Refrigerators should be cleaned by using kerosene, gasoline, warm water and soda, vinegar, salt.

The best-answer type of exercise. This is a type of the multiple-choice test. In the test, a portion of which is given below as an example of the best-answer test, the pupil is instructed to check the most reasonable answer.

¹ Quoted by permission of the Public School Publishing Company.

TESTS IN AMERICAN HISTORY

DEvised BY C. A. GREGORY

Test II, Form B, Part 2

1. During Jefferson's administration the territory of the United States was enlarged by
 - ... the addition of the Northwest Territory.
 - ... the purchase of Louisiana.
 - ... the purchase of Florida.
2. The Twelfth Amendment to the Constitution of the United States changed the method of electing the President. Which of the following men was the first to be elected under the new method?
 - James Madison.
 - Andrew Jackson.
 - Thomas Jefferson.
3. The Federalist Party led by Hamilton was made up of individuals known as
 - "Broad or Loose Constructionists" who believed in interpreting the Constitution liberally.
 - "Strict Constructionists" who believed in keeping the powers of the National Government within rather narrow limits.
 - Democratic-Republicans who believed in reserving most of the power for the States.

The matching exercise. The matching exercise is a variation of the multiple-response test. An illustration of the matching test is given below.

UNITED STATES HISTORY

Write in the blank before each event the number of the man connected with the event.

MEN	ANSWER	EVENTS
1. George Washington		Inventor of the cotton gin
2. Harvey W. Wiley		Louisiana Purchase
3. Thomas Jefferson		Forest conservation
4. Robert E. Lee		Development of banking system

MEN	ANSWER	EVENTS
5. William J. Bryan		Pure food laws
6. Alexander Hamilton		President of the Confederacy
7. Eli Whitney		First President of the United States
8. Robert Fulton		Advocate of free silver
9. Gifford Pinchot		Inventor of the steamboat
10. Jefferson Davis		Commander of the Southern armies

The matching test may take many forms, such as: countries — capitals; men — movements; dates — events; causes — effects; element — atomic weight; synonyms — antonyms; genus — species; and vocabulary — association. A form of the matching test is the ranking, or arrangement test, by which a given number of items are ranked in the order of time of happening, of merit, or on the basis of some other criterion, such as is illustrated by the following extracts from instructions given to pupils taking such tests.

“Arrange, in the order of their happening, the following events by writing the number 1 after the one happening first, the number 2 after that happening next, and so on”; and, “Of the names of countries listed below write 1 after the name of the largest country, 2 after the next largest, and so on.”

2. Advantages of these types of tests

Criteria. We noted in the previous chapter that the criteria by which we should judge a standard test or scale were:

1. Purpose for which the tests are to be given.
2. The validity of the tests for the subject and purpose.
3. The reliability of the tests.
4. The objectivity of the tests.
5. The question of usable norms.
6. The administrative economy of the tests.

If item 5 pertaining to norms be omitted, the remaining five standards constitute the criteria by which we should judge the merit of any written examination. The new types of tests excel the old "essay" type of examination quite markedly on three of the five remaining points. Let us examine the ways in which they excel.

Increased reliability. Ruch calculated the coefficient of reliability of five types of objective examinations, using fifty items each. The average of the reliability coefficients found was to be .761. A good estimate of the time necessary to give a test of this type of fifty items would be twenty minutes. The present author prepared three essay-type examinations, having two forms of five questions each, and gave these to three high school classes in history, civics, and literature respectively. All the papers were scored by the author personally. The reliability coefficients found for these were, .56, .57, and .41, respectively.

Ruch also furnishes us, in his book on *The Improvement of Written Examinations*, with some statistical data on the relative reliability of the ordinary examinations and the new types. He chose at random a set of examination papers of the "essay" type, for each of ten elementary school subjects. He determined the respective reliability of these papers by correlating one half against the other half. The average reliability of the ten sets was .57, the respective coefficients ranging from .94 for spelling to .39 for a set in grammar with .40 for a set in history, and .39 for a set in civics. The reliability of no other set approached that of the spelling test. A set of arithmetic papers gave a coefficient of .72, a set in civics .68, another set in arithmetic .66, and one in geography .65. The fact that the two sets for civics varied as much as from .39 to .68 indicates that it is possible to select questions and work answers in such a way as to increase materially the reliability of a test.

The average reliability obtained by Ruch for the "essay" tests, namely, .57, is somewhat lower than the reliability usually obtained for objective examinations. In another experiment conducted by Ruch the average reliability of five types of objective examinations was found to be .70, the true-false type, only, furnishing as low a coefficient as the average for the essay type. The coefficient for the true-false type was .56.

It is easy to see the reasons for the higher reliability of the new type of examination. The definiteness of the question or exercise operates to reduce chance fluctuations in the pupil's answers. The pupil is not confused by the necessity of giving some attention to composition, and is not disturbed or impeded by responsibility for penmanship. The standards of what is desired as a correct answer are much more definite, whereas questions beginning "describe" or "tell" are clearly somewhat indefinite. Wandering and verbosity, so often found in the answers to questions beginning "describe" or "tell," are eliminated. The inevitable result is increased consistency in the pupil's responses — increased reliability. If for no other reason, the increased number of items, operating to reduce the relative influence of chance mistakes, would contribute quite heavily to increased reliability.

Greater objectivity. It is hardly necessary to dwell upon the marked superiority of the new types of examinations as regards objectivity. The factors which contribute most heavily to variations in the marks assigned given papers by various teachers, or by the same teacher at various times are:

1. Differing standards among the teachers, or from time to time, as to excellence or merit.
2. Differences in emphasis placed upon different parts or phases of the papers or answers.

3. The tendency to allow handwriting, composition, and personality of the child to influence the marking of the paper.
4. Differences in care exercised in marking papers, and differences among teachers in ability, judgment, disposition, and temperament.

These factors, which affect marks given papers of the ordinary type of examination, do not enter into the marking of papers written in the new types of examinations. Usually there is but one standard of excellence, easily understood, and upon this there can be no disagreement in the marking of the papers. Answers are either right or wrong; no judgment as to intermediate degrees of merit is involved. The exercises of the test are so selected and worded as to preclude the possibility of more than one correct answer. The scoring of the paper is little more than mechanical. The pupils' answers involve no handwriting or composition. In some types of true-false tests a plus or a minus sign is all that is made by the pupil; in others, as in the case of the multiple-response tests, the pupils' writing is limited to underscoring a word or a phrase.

Because of the very small opportunity for the exercise of opinion on the part of the scorer in assigning marks to the answers made by the pupils, differences in power of judgment in disposition and in temperament of the teachers do not influence the score. Even differences as to the care exercised in marking the paper will produce less variability, because of the simple burden placed upon the scorer in marking the short, definite answers.

Ruch had three teachers regrade ten sets of examination papers of the traditional variety. The average coefficient of correlation, which constitutes a good measure of objectivity, was .82. To be compared with this, the present author found, for objective examinations where the questions were carefully selected, that the coefficient of cor-

relation between the marks of one teacher with those of another will be much higher, and should lie between .95 and 1.00.

Administrative economy; time saved in giving. It is clear that several times as many questions or exercises of the new type may be included in a given period of time as is possible when essay questions or exercises are employed. Ruch estimates the number of exercises of the new type that may be completed by school pupils per unit of time as follows:

<i>Type</i>	<i>Time to complete 100 items</i>	<i>No. of items can be given in 18.2 minutes</i>	<i>Reliability of 100 items</i>	<i>Reliability per 18.7 min. working time</i>
Recall	18.7	100	.90	.90
Five-response	16.0	117	.89	.90
Three-response	13.5	139	.75	.81
Two-response	11.4	164	.85	.90
True-false	10.2	183	.71	.82

Although the time required of pupils for completion, recall, recognition, and true-false exercises varies with the individual pupil, with the difficulty and complexity of the questions or problem, and with the amount of handwriting to be done, it is safe to say that 5 to 20 times as many such questions or items may be included in an examination of the new type as may be included in a traditional type examination requiring the same time for pupils to take. As a consequence, the time required to give such examinations with the same degree of thoroughness and reliability is much less.

Time saved in scoring. It is likewise obvious that the new examination may be scored much more quickly than the older type. A standard paper of correct answers may be written out in a few minutes; and where the places for the answers have been arranged in a column at the left or the right of the paper, the scoring may be done very rapidly, requiring but a fraction of the time needed to read and

evaluate answers to the traditional type of examination question.

Time may also be conserved in another manner. Teachers often make a practice of permitting pupils to mark written work and quiz papers. While the practice is of doubtful merit, test papers of the objective type may be scored by pupils with much less chance of error than can the ordinary type of examination papers.

Comparative merits of types of objective examinations. While all of the new types of examinations partake of the advantages over the traditional examinations discussed above, they do not do so to the same degree.

Ruch and Stoddard furnish us with some very satisfactory experimental data as to the relative reliability of five different types of objective examinations, as follows:

<i>Type of test</i>	<i>Coefficients of reliability</i>
Recall	.90
Five-response recognition	.89
Three-response recognition	.78
Two-response recognition	.85
True-false	.71

The recall test which they used required 18.7 minutes to give, while the time required for the other tests ranged from 10.2 to 16.0 minutes.

If each of the other tests had been of a length to require an amount of time equal to that required by the recall test, they would have had to include the following numbers of items respectively; and the tests of that length would have possessed reliability as indicated:

<i>Type of test</i>	<i>No. of items</i>	<i>Coefficient of reliability</i>
Recall	100	.90
Five-response	117	.90
Three-response	139	.81
Two-response	164	.90
True-false	183	.82

We can conclude then that for tests of the same number of items the recall and five-response tests are much more reliable than the other types, but that, among tests requiring the same amount of time there is not so much difference, though the true-false and three-response tests are appreciably less reliable than the other types.

We have no statistical data on the relative objectivity of the various forms of the new examination. It would seem that, with the exception of tests containing items testing judgment or other matter concerning which there is a diversity of opinion or feeling, there should be no difference in objectivity. In fact it would seem that, except for carelessness in formulating the questions or in marking the answers, all the types of tests should be approximately 100 per cent objective.

Of course, in those cases where the tests contain items involving organization, judgment, or feeling, different teachers are likely to disagree to some extent as to the correctness of answers. However, this situation is as likely to occur in one type of objective test as another, with the possible exception of the recall type, which of course is likely to be less objective. Unless the scorer insists upon absolute word for word response, the completion type of test permits differences in opinion in the evaluation of the responses.

As has already been indicated, the true-false test requires less time for giving than any other type of test of the same number of items. In general, the larger the number of possible responses a pupil may make to a test question, the longer it takes him to choose. For example, a 5-response multiple-choice test requires more time than a 3-response, everything else being equal. Tests and exercises involving recall require more time than do those involving recognition only. As previously noted, Ruch and Stoddard

found that the number of items that can be answered in the time required for 100 items in a recall test are as follows:

Five-response recognition	117
Three-response recognition	139
Two-response recognition	164
True-false	183

As far as scoring is concerned, more time is required to score recall exercises, especially where complete statements are permitted as answers, and where more than one correct answer is permitted. True-false, yes-no, matching, and completion exercises may be scored much more rapidly. The completion and the enumeration types of test, on the other hand, are much easier to formulate, and require less time to prepare. It is difficult to say that any one of the types of objective tests is, in general, more valid than the others. There is a much larger possibility of difference in the validity of two tests of the same type. Tests which measure information alone, in a subject where ideals, habits, skills, or attitudes constitute the more important objectives, are not very valid for that subject, regardless of how objective or reliable they may be.

3. Objections to and shortcomings of the new examinations

Five objections commonly made. It would be unusual for a new device or plan which possesses so many advantages to possess no limitations. The new objective examinations have their limitations and dangers. Some of the objections made to their use, however, are at least debatable. Five common objections to the new types of examination seem to warrant consideration here.

They do not measure the important outcomes of teaching. It is charged that the new objective examinations measure

information only, and that they do not measure certain very important educational outcomes, as skills, habits, attitudes, and ideals. For this reason they do not measure complete mastery of the subject-matter. They do not lend themselves well to measuring skill in organization and application. The student is not permitted to show how well he has grasped the full significance of what he is being tested on, because there is no opportunity for free, organized and individual expression. It is also objected that there is no opportunity either for evaluation or criticism.

It must be admitted that the tests are much better adapted to the testing of information than for measuring skill in application or organization, or other types of educational outcomes. On the other hand, too much should not be conceded on this point. Judgment may be tested as well as memory, as may be seen in question 1, below. The ability to organize is involved in such questions as number 2. Attitudes and ideals may be measured by questions such as numbers 3 and 4.

1. A square circumscribed about a circle is less in area than an octagon so circumscribed.
2. Arrange, in the order of their importance, three weaknesses of the Articles of Confederation.

1.
2.
3.

3. Was Benedict Arnold a man to
be ashamed of? be loved? be admired?

4. Which is the most interesting? $\left\{ \begin{array}{l} A \text{ Tale of Two Cities.} \\ The \text{ Saturday Evening Post.} \\ The \text{ funny papers.} \end{array} \right.$

Further, it is difficult to say that the essay or discussion type of answer furnishes a better measure of ability to organize and apply knowledge. It is so difficult to devise questions which really test such ability, and which at the

same time may be objectively marked, that it is hard to be sure, after subjective and unreliable estimates as to the value of the pupil's answers are made, that one has a better measure of the ability to organize than can be gotten by the use of more objective tests, even though the latter do seem to lay undue emphasis upon information or other partial products of teaching.

In case it seems desirable, the objective examination may be supplemented with a few questions of the discussion type.

They require time and money to prepare. There is no question but that the skillful preparation of an objective examination requires considerably more time than would the preparation of the traditional type of examination. For classes of normal size or larger, however, the additional time spent in preparing the examination is more than offset by the decreased amount of time spent in marking the papers. Speed and skill in constructing such examinations comes with practice, and the time necessary to construct them properly diminishes with experience. Labor in subsequent tests may also be reduced, as examination exercises may be saved and employed again in tests over the same material.

An item in the expenditure of time and involving expense is the preparation of test blanks, as it is desirable that each pupil be provided with a mimeographed or hektographed copy of the test. This expenditure is not absolutely necessary, however. The exercises may be read to the class, while the students write out the short answers on tablet paper.

They encourage dishonesty. Because of the ease of recognizing a single word or mark, as compared with reading a paragraph on a classmate's paper, criticism is made that dishonesty is encouraged by their use. In the first place, the increased ease of cheating is more apparent than real. The

examination is usually written so quickly that there is little time for looking about, and usually there are so many items that it is hard for a pupil to associate answer with question on another's paper.

By the use of certain precautions, this danger may be reduced to a minimum. Pupils may be given alternate forms of the examination, or, if the test consists of two pages, they may first be given alternately sheets of odd and of even numbers, and later the remaining sheets alternately, so that no adjacent pupils are working on the same page at the same time. Stormzand suggests the clever device of having pupils numbered consecutively and instructed to write "true" or "false," or "yes" or "no," as the case may seem to warrant, to every other question or exercise only, the "odds" taking alternate questions to those assigned the "evens." The whole list is to be read twice, the "odds" and "evens" exchanging papers so that each will have answered all the questions at the conclusion of the second reading.

Students object to the tests. It is claimed that students object to this type of examination more than they do to the traditional type. It is not certain, however, that this is due to any defect in the nature of the examination itself. It is only natural that students who have failed to make the showing which they would have liked to make, or had expected to make, should explain their failure by attributing it to the type of examination used. They insist that guesswork plays too large a part in the examination, or that too much premium is placed upon memory, or that they "just can't do well on that kind of an examination."

It is true that a certain amount of guesswork is possible — probably more than in the older types of tests. Yet, because of the large number of questions, the laws of chance operate to reduce the effect of guesswork to a minimum. It

should be remembered, too, that the opportunity for guesswork in the traditional examination is not insignificant. The objection that the test places too much premium upon memory can be met by including a good sprinkling of judgment and organization exercises, or by supplementing the results of the objective examination with other sources of evidences as to the students' progress, such as papers, class discussion, oral quizzes, and "essay" questions in written examinations.

It is also true that in the new type of examination poor students cannot cover up their deficiencies as well as in the essay type, where they can discourse a maximum amount with a minimum grasp of the subject-matter. Because one does not like to be confronted too sharply with one's shortcomings, such students are not likely to prefer the more definite exercises. With continued use the new type of examination will come to be accepted by students as the older type now is. It must not be forgotten that students not only complain of the other type of test, but that they are prone to question as well the evaluation of their efforts by the teacher. This latter source of dissatisfaction is reduced to a minimum, as the marks assigned to papers on the objective type of test are hardly debatable. On the other hand, not all students object to the improved examinations. Many prefer them because of their definiteness and because they require no composition.

Do not provide training in organization and expression. One of the objections most frequently raised is that the very valuable training in organization and written expression, resulting from the writing of the essay type of examination, is not afforded when the new type of examination is employed.

It is quite probable that much of the mental activity involved in organization is actually performed by the student taking the new type of test, even though the steps are not

recorded on the paper. Even if such is not the case, the indictment is not a serious one. The primary function of the test is to afford a means of measurement. Adequate opportunity for training in organization and expression can be and is provided elsewhere.

4. Technique of the objective examination

Procedure in construction. The procedure in constructing an objective examination may be summarized as follows:

1. Determine what is to be covered in the examination, and get in mind the outcomes of teaching which constitute the chief objectives of the material involved; that is, what information, what skills or habits, what ideals or attitudes were aimed at in presenting the material to be tested, and what is of most worth.
2. Determine how much time is to be given to the test, and estimate how many exercises may be completed by the pupils in the time available.
3. Select about one and one half times as many exercises, testing the possession of information, skills, habits, ideals, or attitudes emphasized, as may be given in the time available, consciously attempting to distribute these among the types and outcomes of teaching somewhat in proportion to the importance of such in the ground covered. The table given on page 439 may be used to advantage in estimating the number of exercises that will occupy a given period of time.
4. In formulating objective test-questions or exercises, one of two plans may be employed: The test exercises may all be of one type, as true-false, completion, or multiple-response; or the examination may be made up of different types. Ordinarily the latter procedure is preferable, since by it the most effective type of exercise for each item may be chosen on an individual basis. Items should be formulated in forms which are most appropriate to what is desired to be tested. Items not of primary importance, and which are difficult to fit into any form, may be tentatively set aside to be used only in case of need of them to give balance or to complete the examination. The shorter the question or exercise the better.

5. Care should be taken so to formulate exercises that something more than memory is tested. Some questions involving reasoning and attitudes should be provided.
6. Care should be taken that there are some questions which all pupils are most certain to answer, and some which very few are likely to answer. The other questions should range in difficulty between these extremes, with a goodly percentage of questions of average or reasonable difficulty. This precaution is desirable in any examination.
7. Go over the test exercises quite carefully, discarding those which are ambiguous, misleading, or which demand elaborate qualification. Reduce the number of test exercises to the desired number, being sure to retain such as will give the test "range," as provided for in the preceding paragraph, and those testing important objectives, and discarding those which are least objective and which serve to test powers tested by other questions or exercises. Care should also be taken to preserve proper distribution among the different parts of the material covered.
8. Rearrange the remaining exercises into groups according to the nature of the exercise; that is, all the true-false exercises together, all the multiple-choice together, and so on.
9. Rearrange within the groups in the apparent order of difficulty, or, if this seems difficult to do, in a logical order. The most difficult exercises should not be placed toward the first of the test.
10. In preparing the blank forms for the test, attempt to control the position of the answers, allowing for them preferably along one side of the page, to facilitate scoring.
11. Prepare a key of correct answers in such a form that it may be laid alongside the pupil's paper, and thus permit of rapid scoring. A cardboard key is very convenient.

Special suggestions on the framing of true-false and multiple-choice exercises. A true-false examination should contain at least fifty or sixty items to be reliable. The number of true and the number of false statements should be not exactly equal, nor always be approximately equal. It is better to vary procedure in this respect, as otherwise students will learn to adapt their answers so as to distribute

them equally between true and false. However, not less than twenty-five or thirty per cent of the statements should be of either type. False and true statements should not be either bunched or alternated, or arranged in any systematic order which would give any clue as to which are true and which are false. Care should be exercised to select false statements which are not obviously false, and which will not permit the student to identify by eliminating the incorrect answers or by any other process of reasoning which does not involve the possession of the knowledge or skill intended to be tested. The false statement should in every case be one which the student would be as likely to designate as true as he would to note its falsity, did he not possess the knowledge or other educational outcomes the testing of which is aimed at by the statement.

For example, the statement that "An ant has three legs" is not a good statement to use in a true-false exercise. Most pupils will identify it as a false one without any reference to how many legs an ant has, because they do not believe that any living thing has an odd number of legs. Likewise the statement that "Chicago is the capital of Michigan" may be identified as false without knowing what the capital of Michigan is, because they know that Chicago is in Illinois.

The same care should be observed in the selection of material for a multiple-choice test. It is obvious that no sane person of high school age would identify a man still living as the first man to sail around the world, or a man who lived before the discovery of America. Here again, the incorrect answer should be such as the pupil might designate as correct in case he does not possess the particular bit of knowledge or skill being tested.

The correct answer should not always occupy the same position, as third, in the possible choices, nor should the

location of it follow any consecutive order, such as fifth, fourth, third, and so on.

In selecting completion exercises, care must be taken to leave the key words blank, and to furnish, in the portion of statement given, enough data to constitute a fair test — that is, to designate what is wanted. If this is not done effectively, the test may degenerate into a guessing contest. For example, in the statement: "The first Continental Congress was held in," the student may conclude, with almost equal right, that what is wanted is the name of the city in which the first Continental Congress was held, or the name of the building, or the year in which it was held.

In an enumeration test one should attempt to formulate exercises which require a minimum of writing, and for which there is only one correct answer; or at least exercises which will permit of little difference in scoring between different teachers. Ordinarily it is better to avoid using exercises in the scoring of which it would be necessary to give partial credit to some papers.

Suggestions for giving objective tests. If at all possible, the tests should be hektographed or mimeographed, so that each pupil may have his own copy. It is a great saving of time, when one considers the amount of student time required in copying the exercise from the board. For small classes enough copies may be obtained by means of type-written thin-paper carbon copies. Every high school of any consequence should possess a mimeograph, or several hektographs. A hektograph of four-sheet size may be obtained from any school supply company for about five dollars. Many teachers prefer to own such a duplicating device and to keep it in their rooms, along with their books and typewriter. One, no doubt, is soon repaid the purchase price in time saved. A good piece of work on a hektograph should yield thirty to thirty-five copies from one copying.

Where no mimeograph or hektograph is available, the questions or exercises may be read aloud to the class. The students number their responses to correspond to the number of the item in the test. If a true-false test is being given, the student may write merely the word "true" for those statements which he believes to be true, and "false" for the others, numbering the answers in consecutive order. If a multiple-response test is being given, the student will write down the response he believes to be best. If there are more than three responses they should be read several times. Completion tests also may be dictated. Care must be taken to be sure that the numbers of the pupils' responses correspond to the number of the test items.

A number of miscellaneous suggestions are worthy of consideration. As stated previously, care should be taken to prevent cheating. A spirit of confusion or hurry is to be avoided. Ordinarily rate tests or time-basis tests are not advisable. Instructions should be very brief, in most instances consisting only of a few sentences, and should appear on the test sheets. Questions from the students while the examination is in progress should be discouraged. The examination should be largely self-explanatory.

Pupils should either be instructed not to guess at all, or to guess at each answer which they do not know, leaving no blanks. The instructions given on this point depend upon what scoring device is to be used.

Scoring objective examinations. There are several possible procedures in scoring. One plan, quite widely used, involves correction for the guessing factor. When this plan is used, students should have been instructed to try all questions or exercises, guessing at those the answers to which they do not know. The theory of the scheme for scoring seems a little complicated at first, but may be clearly understood.

Let us take, for example, a true-false or a yes-no test of fifty items, on which a student has scored 42. Eight items are wrongly answered. It is assumed that these have been guessed at. As there is a fifty-fifty chance of guessing right, it follows then that the most likely number of items guessed at was sixteen, or twice the number guessed wrong. Thus the formula devised for scoring true-false or other two-response tests is expressed as:

$$\text{Score} = N - 2W; \text{ or } \text{Score} = R - W$$

where N is the number of items in the test, R is the number of correct responses by the pupil, and W the number of incorrect responses.

In a three-response test a pupil has one chance in three of guessing right. If guesses are made for every two incorrect responses, there should be one correct response, hence the most likely number of the correct answers which were hit upon by guess is one half the number of incorrect responses. The formula employed now is

$$\text{Score} = R - \frac{W}{2}$$

For a four-response test the formula becomes:

$$\text{Score} = R - \frac{W}{3}$$

The general formula is:

$$\text{Score} = R - \frac{W}{x - 1}$$

where x represents the number of possible responses. While this formula furnishes the *most likely* score, it is quite likely that one will guess correctly a few more or a few less than the number due to chance. To the extent that this hap-

pens the score assigned is not an accurate index of the ability of the pupil.

It is also true that the relative standing of the pupils would not be changed if one simply took the number of correct answers as the score. There is a distinct advantage in following this latter procedure in the case where a test consists of more than one variety of test exercises, as, for example: a section of five-response items, a section of three-response recognition items, a true-false series, and a completion exercise — or some similar combination. If the formula-plan is used, separate scores for each section must be calculated; where the simple plan of counting all rights is used, this is not necessary. In addition it has been shown that the correction for chance tends to decrease slightly the reliability of the scores.

In order that the guessing element may be reduced to a minimum, and scores be less influenced by chance guessing, it is better to instruct the pupils not to guess, and that they will be penalized for answers guessed wrong. Use of the following formula will place a reasonable penalty upon the wrong guess of students who do not obey instructions in this respect:

$$S = R - \frac{2W}{x - 1}$$

The plan of giving each paper a score equal to the number of correct answers, as suggested by some teachers, would be better, could one assume that all pupils followed instructions not to guess. Since not all will do so, the plan just described will prevent the guessing pupil from increasing his score by chance. It is generally agreed that little is to be gained by using weights in scoring the questions or exercises in tests of this kind. The reason why this is true was discussed in the preceding chapter.

QUESTIONS AND EXERCISES

1. What type of examination exercise, other than those mentioned, can you suggest as being well adapted to written examinations?
2. Do you agree with the author's evaluation of the objections to the "new" types of examination exercise?
3. Be able to state in your own words what is meant by "validity," "reliability," and "objectivity."
4. Construct a fifty-item examination for some subject taught in high school, and containing some exercises from each of the following types: true-false, matching, multiple-choice, completion, and enumeration.
5. Give the examination referred to in the preceding exercise to some one, have it scored independently by three other people, and compare the total scores assigned by these people.
6. Show that the last formula given will prevent guessing.

SELECTED REFERENCES

1. General References

Burton, W. H. "Contributions to the Technique of Constructing Best Answer Tests"; in *Elementary School Journal*, vol. 25, pp. 762-70. (June, 1925.)

Douglass, Harl R., and Spencer, Peter L. "Is it Necessary to Weight Exercises in Standard Tests?" in *Journal of Educational Psychology*, vol. 14, pp. 109-12. (February, 1923.)

Statistical evidence that the rank of pupils on certain achievement tests when weights are used in scoring is practically identical with their respective ranks when the exercises are not weighted.

McAfee, T. O. "The Reliability of Non-Standard Point Tests"; in *Elementary School Journal*, vol. 24, pp. 579-86. (June, 1924.)

Statistical evidence in comparing reliability of true-false and multiple-choice tests with standardized and discursive types.

Miller, G. F. "Variations in the True-and-False Achievement Test"; in *School and Society*, vol. 20, pp. 250-51. (August, 1924.)

Describes a type of true-false test with three alternative answers.

Monroe, Walter S. *Written Examinations and their Improvement*. Urbana, Illinois: University of Illinois Bulletin, vol. 20, no. 7. (October 16, 1922.) 71 pp.

Criticism and defense of written examinations with suggestions for improved technique. Special reference to new type. Clear, concise, practical, concrete examples.

Monroe, Walter S., and Souders, Lloyd B. *The Present Status of Written Examinations and Suggestions for their Improvement*. Ur-

bana, Illinois: University of Illinois Bulletin, vol. 21, no. 13. (November 26, 1923.) 77 pp.

A revision of the bulletin described above with the addition of valuable investigations.

Paterson, Donald G. *The Preparation and Use of New-Type Examinations*. Yonkers, New York: The World Book Co., 1925. 87 pp.

A very excellent practical manual for teachers.

Remmers, H. H. "An Experimental Study of the Relative Difficulty of the True-False, Multiple Choice or Incomplete Sentence Types of Examination Questions"; in *Journal of Educational Psychology*, vol. 14, pp. 367-72. (June, 1923.)

A preliminary study of relative difficulty of three types of exercises.

Ruch, G. M. *The Improvement of the Written Examination*. New York: Scott, Foresman & Co., 1924. Pp. x + 194.

Especially Chapters I through V. Best single discussion of theory and technique of new types of examinations. Excellent illustrations.

Ruch, G. M., and Stoddard, G. D. "Comparative Reliability of Five Types of Objective Examinations"; in *Journal of Educational Psychology*, vol. 16, pp. 89-104. (February, 1925.)

Statistical data on the relative reliability of the true-false, the completion, and best-answer or multiple-choice tests of two, three, and five alternatives respectively.

Spencer, Peter L. "Improvement of Teaching by Means of Home-Made Non-Standardized Tests and Remedial Instruction"; in *School Review*, vol. 31, p. 276. (May, 1923.)

An account of the construction of tests for diagnosis by the classroom teacher of mathematics; the principles would apply to other subjects.

Stormzand, Martin J. *Progressive Methods of Teaching*. Boston: Houghton Mifflin Co., 1924.

Chapter VI, "New Methods in Testing." Objections to old forms of testing; improved tests; illustrative examples.

Van Denberg, Joseph K. *The Junior High School Idea*. New York: Henry Holt & Co., 1922.

Chapter XVII, "Written Examinations and Recognition Tests." Discusses true-false, multiple-choice, and completion tests.

2. Special Subjects

Farewell, H. W. "The New-Type Examinations in Physics"; in *School and Society*, vol. 19, pp. 315-22. (March, 1924.)

Melvin, Arthur Gordon. "A True-False Test in English Literature"; in *English Journal*, vol. 11, pp. 491-97. (October, 1922.)

Osgood, Ellen L. "Some Experiments in a New Type of History

Examinations"; in *History Teachers Magazine*, vol. 9, pp. 337-49. (July, 1918.)

Thorndike, E. L. "Completion Tests in Physics"; in *School Science and Mathematics*, vol. 22, pp. 637-47. (October, 1921.)

Tryon, Rolla M. *Teaching of History in Junior and Senior High School*. New York: Ginn & Co.

Chapter VIII, "Measuring the Results of History Teaching." Aims of examinations and tests and scales. Bibliography.

Twiss, E. R. *Principles of Science Teaching*. The Macmillan Co., 1917.

Chapter XXIV, "Examinations and Tests." Also pp. 153-58.

Wood, Ben D. *Measurement in Higher Education*. Yonkers, New York: World Book Co., 1923.

Chapters IX through XII. The new type of examination in the various subjects especially good for teachers of science.

CHAPTER XV

ADJUSTMENT OF INSTRUCTION TO INDIVIDUAL NEEDS

1. *The teacher's problem with regard to individual differences:* Educational waste — Importance of the able pupil — The classroom situation — Changes in the character of the high school student body — Relative distributions of learning capacity — New knowledge as to individual differences — Distribution of intelligence — Class variations in ability — Other types of variation.
2. *Plans employed for dealing with individual differences:* Adjustment of class instruction to individuals — I. The flexible assignment — Examples — Basing marks on quantity as well as quality — Examples — II. Supervised study — III. Adjustment of recitation devices and assignments — IV. Diagnosis of class and individual needs — Creation of diagnostic examinations — Analysis of written test results — Remedial instruction — Use of such procedures becoming more general — Other procedures of analytical diagnosis — V. Homogeneous or "speed" grouping — Advantages of homogeneous grouping — Dangers and limitations — Technique of sectioning — Summary of technique — Differentiated instruction — Comparative values of the two plans — Adjustment of technique for differentiated instruction — VI. Individual instruction — Older plans — Merits and defects — The Dalton plan.
Questions and exercises — Selected references.

1. *The teacher's problem with regard to individual differences*

Educational waste. Abraham Lincoln is said to have remarked, on one occasion, "One knows that God loves the common people; He makes so many of them." It is obvious to all of us that we are all more alike than we are different, and that we possess more common traits than distinctive ones peculiar to one or a small number of us. Yet we feel sure that no two of all the two billion people of this world are exactly alike in all respects. Even brothers and sisters, though having more in common than people not so closely related, are quite different in many ways. Parents are often heard to remark that each successive child is

different from its brothers and sisters, and must be treated somewhat differently. This difference between each person and all his fellows lay at the bottom of an old Quaker's remark to his wife, with whom he had lived some forty years. He said, "It seemeth to me, wife, that all people are queer, save thee and me, and betimes I think that thou art a little queer too."

Yet, in the main, organization of schools, courses of study, and methods of teaching have, in the past at least, been worked out in such a manner as to imply that all pupils may be treated alike. Those having to do with school organization, courses of study, and methods of instruction, appear to have had in mind the mythical "average child." Because this has been so, much educational waste has resulted. The more capable pupils have rarely been worked up to capacity, and the slower pupils have been sacrificed on the altar of standard rates of progress over standard courses of study. Teachers have spent their best efforts in trying to bring mediocre and inferior students up to standard, and in disciplining the brighter pupils who demand occupation. Thomas A. Edison is said to have remarked, of the higher schools, that "they are the places for dulling the diamonds and polishing the brick bats." This may also be said of our public schools as well, where uniformity of output has been aimed at. Many conscientious teachers still spend hours of their spare time in giving special help to students who, by reason of lack of ability, cannot keep up the pace that the school should set.

Importance of the able pupil. What we have come to know about individual differences teaches us that there are approximately as many mentally superior as there are mentally inferior students. For every natural intellectual weakling there is a potential intelligent giant, yet the larger share of the efforts of teachers, and the pressure of super-

visors and administrators, have been devoted to problems of how to bring up to standard the inferior or the uninterested pupils. Not much has as yet been done, speaking generally, to see to it that the pupil of outstanding ability is worked up to capacity. This condition does not exist because of the greater importance of speeding up the pupil of lesser ability as compared with the optimum development of the abler pupil.

The progress of society depends largely upon the contributions of genius. To be sure, it also depends upon a high general level of ability and an informed and a trained citizenry, but the contribution of one Edison, one Pasteur, one Franklin, one Bacon, one Shakespeare, one Aristotle, is of more consequence to civilization and humanity than the tragedies of ten thousand weaklings. The damage wrought by one great demagogue, one great jingoist and militaristic leader, or one weak but ambitious ruler wreaks more havoc, and will deter the advances of society more, than the activities of ten thousand illiterates, economic dependents, or petty criminals. The schools have just begun to take practical cognizance of these truths.

The classroom situation. No matter how much people seem to be alike, no matter how similar the school environment of high school pupils may have been, in every typical class of twenty to thirty youngsters there are pupils who can accomplish, in a given period, two or three or more times as much work of a given difficulty as can be done by other pupils in the same class; there are also pupils who can accomplish tasks of difficulty considerably greater than can be accomplished by others of the class.

The situation is aggravated by the conditions under which high school teachers work. With five or six classes a day and usually extra duties related to extra-curricular activities, or administrative or supervisory responsibilities, little time

is left for giving individual help and instruction. A class hour of from forty to fifty-five minutes is hardly more than time enough to sample the general progress of the class, do a little teaching aimed at the middle fifty per cent of the group, and make a general assignment.

The situation is further aggravated by the dependence of the typical high school teacher upon the textbook. This has almost invariably been written for the "average" pupil and provides in itself no arrangement for those who vary somewhat widely from the average. There are no flexible or differentiated assignments, no supplementary materials for the bright and capable pupils, no selection of minimum essentials, and no special help for the slow. Few teachers, too, have had any training in methods of differentiating pupils, of individual diagnosis, or of adjusting the materials of instruction. They are in large part college graduates who have taken a few courses in education to meet the legal requirements for certification, are young at the teaching work, and are dependent upon individual enthusiasm and ingenuity for the solution of the problem which they face.

Changes in the character of the high school student body. The two developments which, in recent years, have operated to accentuate the situation and to reveal the need for better adjustment of our high school instruction to the variations among individual pupils have been: (1) the marked increase in enrollment in the secondary schools and (2) the increased appreciation of both the degree and the significance of the differences between the capacities and abilities of high school pupils.

While we have no definite measurements which would give us accurate data regarding the average and the range of abilities of high school pupils at any period of the nineteenth century, it is quite commonly agreed that the quadrupling of the percentage of the total population going to

high school within the past thirty-five years has resulted in the lowering of the average level of ability of high school students, and in a marked increase in the width of range of their intellectual abilities and capacities. That is, it is generally conceded that up to thirty to thirty-five years ago those who persisted through the elementary school and into the high school constituted a somewhat selected body of boys and girls.

Although we do not know to just what extent the high school tended thirty years ago to receive only the brighter students, as compared with the high school to-day, we know that a selective force was and still is in operation. Thorndike has suggested a selective force of as high as $r = .70$, which means that there is a tendency for the students in the high schools to be the brightest pupils of their age corresponding roughly to a degree of .70. Where $r = .00$ would mean that the boys and girls going to high school were of the same average intelligence as those who did not, and where $r = 1.00$ would signify that all high school students are more gifted in intelligence than all students not going to high school.

Relative distributions of learning capacity. It has been only a few decades since scarcely one pupil in ten entered high school; now more than one in three does so. Thorndike has calculated what percentage of pupils attending high schools lie in the successive tenths or deciles of intellectual capacity, in the two cases: first, where only one of ten young people enter high school; and second, when one in three enter, assuming in both cases a selective factor of .70. These two distributions are given below.

DISTRIBUTION OF INTELLECT IN 1000 PUPILS OF THE FIRST YEAR
OF HIGH SCHOOL, ACCORDING AS ONE IN TEN OR THREE IN
TEN ENTER HIGH SCHOOL

Degree of intelligence..	1	2	3	4	5	6	7	8	9	10
One in ten	0	2	7	15	28	48	80	130	223	467
One in three	4	17	32	47	71	95	124	157	198	255

The above table indicates, if the selective force be .70, that among the first-year students of high schools of to-day there are over three times as many pupils in the lower five degrees of intelligence as there were a generation ago; and also that there are only sixty-four per cent as many pupils ranking in the upper twenty per cent in intelligence as at that time. It also shows that, whereas a generation ago approximately seventy per cent of high school freshmen — probably including all that would go beyond the first year — were comparatively homogeneous, lying within the upper two tenths of ability, now the upper seventy per cent extends as low as the seventh decile and over a range of four deciles.

It seems quite well established that the unprecedented increase in high school enrollment that has taken place in recent years has resulted in an increased spread in the range of intelligence and ability of high school pupils, and thus in the aggravation of the problem of adjusting instruction to individual differences.

New knowledge as to individual differences. Other events of far-reaching importance, which have accelerated the movement and extended our knowledge as to the size of this problem, may be briefly enumerated here. These have brought it to the foreground and focus of attention of those interested in education, and have given us vastly increased information concerning the spread and nature of individual differences.

Among the more important recent movements have been the development of the standard tests and scales for measuring school achievement. These date in their development back only to about 1910. By applying these standard and objective measures to whole classes, schools, and school systems we have been brought to see how much variation there is, in the various school subjects, between pupils of the same grade and between pupils of the same age. The even

later development of intelligence tests and the application of these to children in large numbers disclosed to us still more the wide variations in human intelligence. The substitution of group intelligence tests for individual tests only increased our knowledge as to the extent of the problem. Another development of importance has been the recent rapid growth and expansion of departments of education and psychology in our colleges and universities. Professors and research students, as well as administrative officials, have recently gathered much important data regarding the abilities and achievements of school children, and much of this has been published in educational and psychological journals. The school survey movement, too, as developed by Hanus, Cubberley, Strayer, and Judd in the decade of 1910-20, also contributed much to bringing the facts as to individual differences to the foreground.

Distribution of intelligence. As Lincoln noticed, there is a preponderance of the common people, and there are much smaller numbers of very bright and of very dull people. The duller or brighter the degrees of intelligence, the smaller is the number of people of the degree under consideration. To show the nature of the distribution of intelligence among school children, we reproduce below a chart from Terman which shows graphically the distribution of intelligence as measured by the Stanford Revision of the Binet-Simon intelligence tests. The similarity of this figure to that of the normal-probability curve (see page 380) will be evident at a glance.

It is easy to see from such a figure how great is the range of intelligence, and how impractical and wasteful it is to treat all pupils in school alike. Some are several times brighter than others and require work of a much more difficult nature and much more of it if they are to be worked up to maximum capacity. The distribution of abilities and

achievement among school pupils of the same grade is of similar range and strikingly similar in the manner of their distribution. One also finds much overlapping in abilities

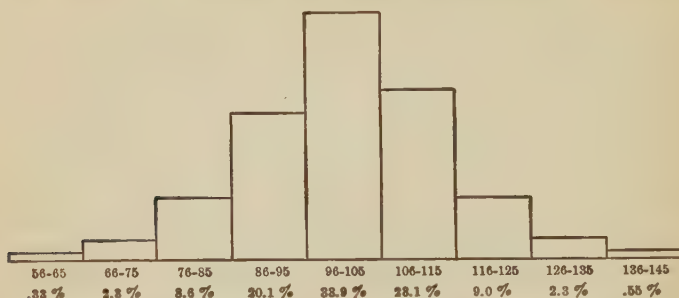


FIG. 3. DISTRIBUTION OF I.Q.'s OF 905 UNSELECTED CHILDREN
5-14 YEARS OF AGE

so that we find some students in a given grade exceeding in achievement in school subjects the average of the next grade or even that of the second grade in advance of that in which they are enrolled.

Class variations in ability. It should not be supposed that in every class such a distribution of intelligence or achievement will be found. The smaller the number in the class, the less likely will the distribution of ability conform closely to the normal curve, though it may resemble it closely even in small classes. The larger the number in the class and the more representative it is, however, the more likely the distribution will conform to the curve, and the more similarity will there be.

The distribution in intelligence found in small groups often varies somewhat from the "normal," because of the fact that in small groups it is very likely that there will be more, or that there will be less, cases for any given score or amount of whatever traits or ability is being measured, than the

proportion called for in a normal distribution. Sometimes factors operate to cause the group to be what we call "a selected group." A selected group is one which, because of the manner of the selection of the members composing it, is certain to contain either more or less of cases of some one degree of trait or ability than would be "normal."

In general, however, with classes of from twenty or more students upwards, where there is no reason to suspect much selection, it is safe to assume that the distribution of ability is approximately "normal," and to modify this assumption only as a result of careful study of the class. Very often the apparent distribution of ability within a class is due to the disposition and prevailing "feeling-tone" of the teacher. To some teachers all pupils seem capable and each class superior; with other teachers the curve of distribution of ability is "skewed" in the other direction, and all pupils are dull or lazy. With still other teachers every class is composed of only bright pupils and slow pupils; for them there are none of medium ability. To still a few other teachers each class seems to be made up of pupils about all of whom are on the same intellectual level.

Teachers are apt to jump at conclusions as to the distribution of ability in classes, as when they go by the previous reputation of the class or of certain groups or individuals, or when they judge by their disciplinary reactions. They may mark according to their own states of mind and health. These dangerous tendencies must not be forgotten when the task of adjusting school work and methods to classes, groups, or individuals of differing abilities is at hand.

Other types of variation. As in intelligence, youngsters tend to be similar in their interests, and yet they differ quite significantly in many ways. Tastes, previous experiences, and ideals differ among individuals, and result in differing attitudes toward the materials and methods of instruction.

Young people differ, too, as to the type of work they like to do. They differ in the type of incentives which appeal to them, in suggestibility, in emotional stability, in habits, in persistence, and in character traits.

What is also of significance to the teacher, the home environment of pupils within a class also differs widely, and the training which the pupils bring to the high school also varies greatly. The social heredity, ideals, standards, conventions, habits, and method of speech and thinking also vary. The apperceptive mass of each one, and his stock of "complexes" — emotional and personal — are far from uniform. It is hardly necessary to add that another of the factors that must condition the quality and the quantity of the work done is the varying physical development and conditions of health of the different pupils.

A most baffling type of variation among individuals is that of special disabilities. Just how much the evidences of special disability, such as the failure to do satisfactorily the work of a class in Latin, algebra, or music, are due to actual mental inability, and how much to lack of interest, lack of confidence, a conviction on the part of the learner that such a disability exists, or some other emotional complex, is hard to say.

2. Plans employed for dealing with individual differences

Adjustment of class instruction to individuals. Among the devices employed in an effort to adjust class instruction better to the needs and abilities of individuals, have been the introduction of elective subjects and curricula; and the introduction of such administrative devices as special schools, rooms, or teachers; credit for quality; light and heavy student-programs; administration of extra-curricular activities; special opportunity classes; frequent reclassification; and the visiting teacher. As plans of these types are

special problems in the administration of the school or the curriculum, and concern especially the school administrator, they will not be discussed here. Just how far the elective system ministers to differences of intellectual ability and special disabilities it is hard to say, but probably not so much as is commonly thought; as a means of ministering to differences in need and interest, though, there is no question of the effectiveness of it.

Of the other devices employed to adjust instruction better to individual needs and capacities, we shall consider the following as being the more important ones for the teacher to know and to use:

1. The flexible assignment, marking on the basis of quality of work.
2. Supervised study.
3. Adjustment of recitation devices and assignments.
4. Diagnostic testing and remedial teaching.
5. Homogenous grouping by classes and within the class.
6. Differentiated instruction.
7. Individual instruction.

I

The flexible assignment. One of the simplest of devices employed for dealing with individual differences in working capacity consists in making flexible assignments of work to be done. This, for the high school, is a continuation of the same idea as is represented in minimum, average, and maximum courses of study for the grades. Instead of segregating the pupils into different classes, though, the different pupils in the same high school class may choose to do differing amounts of the quantity of work given out. What is meant can be indicated best by reproducing examples of such assignments.

Excellent examples of the flexible assignment, as employed

in the English classes of the Rochester, New York, junior high schools may be found in McGregor's *Supervised Study in English* (Macmillan).¹ One example is reproduced below, by way of illustrating what may be done.

STUDY OF TWO POEMS

1. *Minimum:*

- a. Which poem do you like better, "A Rainy Day" or "The Bugle Song"?
- b. Memorize the one you prefer.

2. *Average:*

Choose one of the poems on the desk (typewritten copies of each of five poems had been provided). Read it to yourself and decide what feelings it arouses in you.

3. *Maximum:*

Write a stanza of your own which will express peacefulness. All students do the minimum assignment and as much of the others as they can and will, attempting the additional work under 2 before going to 3.

Miss McGregor reports the following distribution, in a class of 33 pupils: Minimum 16, Average 14, and Maximum 3. As compared with other flexible assignments reported, the number completing the minimum only here is large. Usually the minimum group is materially smaller than those doing also the additional work intended for the average.

The following additional example of a flexible assignment is taken from Mabel Simpson's *Supervised Study in American History* (Macmillan).¹

UNITED STATES HISTORY

1. *Minimum Assignment* (written work):

1. What was happening in France about the time Washington was inaugurated?

¹ Reprinted by permission of The Macmillan Company, publishers.

2. As a result of the French Revolution, what enemies did France gain among the nations of Europe?
3. Give one reason why France was confident of aid from the United States.
4. How was Citizen Genêt received by the American people?
5. What did he do and with what results?

II. Average Assignment (written work):

6. Why did Washington issue a proclamation of neutrality at that time?

III. Maximum Assignment.

7. Write at least two paragraphs contrasting the United States of 1793 with the United States of 1917, as to her standing among nations of the world.

Another type of flexible assignment frequently employed, and sometimes referred to as the indeterminate assignment, is that of setting minimum and maximum limits to assignments. A teacher assigns a number of exercises, problems, examples, collateral readings, experiments or lines of translation. Of the total assigned, a certain number are designated as the minimum goal for each pupil. Those who can and will are to do as many more as they are able to do. The fundamental point to keep in view in using such a plan is, so far as possible, to so differentiate between the minimum assignment and the additional problems, references, etc., that the latter demand a somewhat higher level of ability than the former. If possible the assignment should be in an ascending order of difficulty. The assignment should also be such as to furnish an incentive, through the use of marks or credits, for the able to work up to capacity. A natural corollary of the flexible assignment then comes in the provision for higher marks for those completing the maximum assignments, most regularly and most thoroughly.

Basing marks on quantity as well as quality. A most excellent description of such a flexible plan for giving credit, as employed in the University of Wisconsin high school, was

contributed by H. L. Miller, director of the school, and Dorothy Johnson, in an article cited in the references at the close of this chapter.¹ In this article the authors pointed out the advisability of insisting upon adequate mastery of the minimum essentials, with provision for mastery on the part of different individuals of the same assignment. This idea in itself is well worth thinking about. As they state, "On the whole, the lowest third, if not the lowest half, of school marks may carry practically no guarantee of mastery."

The following selected sentences from the article will serve to give a general idea of the Wisconsin plan. The entire article is well worth careful study.

We have also the eternal problem of individual differences. To meet this, sectioning classes is suggested. This is only a partial solution. Our suggestions are made on the theory that the problem of individual differences can be adequately met by regarding the student, rather than the class group, as the educative unit. . . . The marks employed in rating students in our classes are no mastery, fair, good, and excellent. . . . The work has been arranged in units which we call challenges. . . . The daily lesson-assignment is not employed. . . . A challenge engages the class for varied periods of time — two weeks to five or six weeks — depending on the nature of the problem.

An ascending scale of mastery is provided. Each statement of work above the first is cumulative. Three blocks of material are laid out in each challenge. The first block contains the organizing principles and essential processes in the challenge. The second and third blocks contain all of the first block, and such elaborations in each case as the subject warrants.

In order to receive a mark of fair, the student must make a mark of excellent in the first block of material; that is to say, there is no recognition of a fair or a good mastery of the material; it must be mastered in its completeness. Fair describes the extent to which the student goes. The quality of understanding may be quite as adequate as that of a student with a higher mark. By the same token, the student must make a mark of excellent in the second

¹ In *School Review*, December, 1922. Quoted by permission of the publishers, The University of Chicago Press.

block of material in order to receive a mark of good in the challenge. In the third block the student earns a mark of excellent by doing it on the basis of excellence.

Two illustrations of flexible assignments with differing marks for quantity and quality, taken from the same article, are reproduced here to show the nature of what they suggest as desirable:

AREA OF POLYGONS

In a class of thirty-nine pupils in geometry (tenth grade) "Areas of Polygons" was the challenge. Twelve days was the time allotted to this challenge.

I. In order to receive a mark of fair the student was aware that he would have to make a mark of excellent in a mastery of the following: measurement of equal areas; fourteen propositions (theorems and problems) clearly specified; a statement of ten corollaries; and at least two simple exercises illustrative of such of the propositions as carried applications of the law of triangles.

II. In order to receive a mark of good the student was aware that he would have to make a mark of excellent in the following: all of I, and in addition at least sixty exercises among those which accompany the propositions as they are developed. Certain exercises were marked for omission.

III. In order to receive a mark of excellent the student was aware that he would have to make a mark of excellent in the following: all of I and II, and in addition at least forty supplementary exercises listed in the back of the book (Wells and Hart) on "Areas of Polygons."

BEGINNING FRENCH

A challenge in Beginning French (ninth grade) covering a period of four to five weeks, was as follows:

I. Requirements for fair:

1. Memory work:

a. La Grenouille.

2. Composition:

a. Written — review any story already read and base on it a play, conversation, description, etc., of 100 words.

b. Oral — answer by questions based on the following stories in Longman: 6-7-12-13-16-19-21-22-23-26-29-34-36-38-40.

3. Translation:

a. English to French — any one of the following, 6-7-8-9-10-14-17-18-27-28-29-30-31-35-36-37-39.

b. French to English — any one of the following texts: 14-15-17-18-20-24-25-27-30-32-33-35-37-39.

4. Reading:

a. Prepared — five lines.

b. Sight — five lines.

In order to earn a mark of fair, a mark of excellent must be earned in I.

II. Requirements for good:

a. La Grenouille and Le Corbeau et le Renard.

1. Memory work:

2. Composition:

a. Written — read a story outside of class and write a synopsis or conversation based on text, etc. 150 words.

b. Oral — answer any questions on any story in Petits Contes.

3. Translation:

a. English to French — any in the Longman text.

b. French to English — sight.

4. Reading:

a. Prepared — ten lines.

b. Sight — five lines.

In order to earn a mark of good, a mark of excellent must be earned in II.

III. Requirements for excellent:

1. Memory work:

a. La Grenouille, Le Corbeau et le Renard, also La Cigale et la Fourmi, or the presentation before the class of some already prepared play.

2. Composition:

a. Written — write in French 150-300 words on the geography of France and its history, descriptions of landscapes, lives of great men, etc.

3. Translation:

- a. English to French — sight — some five lines.
- b. French to English — sight — some twenty lines.

4. Reading:

- a. Prepared — fifteen lines.
- b. Sight — ten lines.

In order to earn a mark of excellent, a mark of excellent must be earned in III.

Additional Requirements

1. No one may come up for examination on any of the requirements in one of the advanced groups until all of the requirements of the previous group or groups have been complied with.
2. In sections where one out of a number of prepared answers is to be asked for, the number will be drawn by lot at the time of the examination and must be answered immediately.
3. The word "prepared" under "Reading" indicates that students are to take the required number of lines from any French text they desire; they are to study these lines so as to be able to read fluently and correctly.
4. All outside texts must be approved before work on them can be begun.

Professor Miller and Miss Johnson state that the main points they wish to make are that a sense of mastery can be attained by practically all pupils who may be induced to catch the contagion of work; that individual differences can be recognized in a class, perhaps to the advantage of every member in a group; and that school marks gain a new significance when there is a clear indication that every passing mark carries mastery of something very definitely worked out and very adequately checked.

II

Supervised study. In a previous chapter, supervised study was mentioned as an opportunity for adjusting school work to individual differences. In those schools where

lengthened periods are in use — fifty-five to ninety minutes in the high school, and forty-five to sixty minutes in the upper grades and high school — the supervised study organization provides most favorable opportunities for putting into practice devices designed to adjust school work to individual differences.

The supervised study period offers, among others, the following special opportunities:

1. The instructor may, by incidental and friendly individual conferences, have opportunity to gather information which will furnish a basis for diagnosis and individual treatment, such as special difficulties, home and outside influences, the student's chief interests, special antagonisms or other complexes not favorable to the subject-matter or to the teacher, and special handicapping factors, such as health, worries, demands on time out of class, etc.
2. It is possible to adapt the assignment much better to the needs alike of the slower and the abler students, as there is less necessity for caring for the individual difficulties of the slow students in the preparation of the class as a whole for the assignment, and the opportunity is provided for supplementing the assignment for the abler students.
3. Because of the lengthened period, division of the section into two or even three sub-sections is much more easily carried on. In case the plan of having the class period divided between the sections for separate recitations is employed, the increased amount of time available is very acceptable.
4. The opportunity for personal help and conversation, free from the formality of the class recitation and the possibility of privacy in contact with pupils may both be used to excellent advantage in the hands of the clever teacher to adapt both criticism and approval, and encouragement and rebuke, to the individual nature of the

pupil without assuming before the class the rôle of varying standards. All the special advantages that attend private talks in these connections are available to the teacher.

5. The teacher can more easily pierce the defense of sophistication and indifference that many pupils assume in the presence of a class of their fellows, but which weakens before personal and informal contacts.

6. An opportunity to give individual help to pupils on difficulties peculiar to them, not only in the case of the slow but of the medium and brighter pupils, and also to pupils whose difficulties are individual because of absence or because they are transfers.

The dangers and pitfalls attending the use of supervised study have been discussed in a previous chapter. In addition to those stated there should be mentioned the necessity for the exercise, on the part of the teacher, of much tact and discretion, the tempering of enthusiasm with reserve, and the ability to restrain one's self from too much "mothering." The best work of this sort can be done only after an acquaintanceship of some time, and then as suggestive rather than as argumentative or exhortatory appeals. In no type of school work are qualities of personality more necessary — quiet, pleasant, confidence-inspiring dignity; a sense of humor; and the qualities of passive sympathy, fairness, and freedom from pettiness.

III

Adjustment of recitation devices and assignments. Many teachers are quick to note the differences in ability and character among pupils in their classes, and to adjust the recitation procedure and matters of management to the evident individual needs. Questions of differing degrees of difficulty should be distributed with the relative ability of the students in mind, giving the more difficult questions to the more capable students.

In the reception of answers, too, approval or disapproval should also be adapted to the individual so as to obtain the response most favorable to interest and effort, and without bad effects upon the class as a whole. Even varying standards may here be observed to advantage, as holding the more capable students to more complete and accurate answers, as their differing abilities will justify, and refraining from a too critical attitude toward the efforts of the less gifted.

The best teachers are always on the lookout for opportunities to find extra activities for the brighter students — extra assignments which will exercise their superior powers, and which will open new avenues of interest. Readings, reports, projects, the preparation of illustrative material, and similar activities are useful for this purpose. Not only may such aids be found helpful as a means of providing for the pupil of superior ability, but occasionally some attractive or interesting reference may be assigned to a pupil because of his peculiar interest, or because of the need of arousing interest.

IV

Diagnosis of class and individual needs. Difficulties, errors, and progress are individual matters. The same explanations, drill, texts, and instruction will not result in the same educational outcomes and to the same degree with different children. Not only do youngsters differ widely in the degree to which they profit from similar opportunity to learn, as may be readily seen from the results of any test or examination, or from the distribution of the teacher's marks received by members of a class, but those of like score or mark differ as to specific weaknesses and as to the need for adapting instruction to them.

It is not wise to continue to drill the class as a whole over

the same material, after the points of general weakness have been eliminated. Instead, it is only good common sense to drill the individual pupil upon the points in which he is individually weak. Along with the increased importance attached to the problem of individual differences and with the development of standard tests, there has grown up among teachers a feeling of necessity for individual diagnosis and remedial teaching.

It has long been the custom of teachers to make note of the outstanding and general difficulties of classes, but little has been done until recently along the line of working out a technique for ascertaining, systematically and thoroughly, what are the special difficulties of the individual, or of the class, and recording these for future reference and guidance in outlining remedial work. The recent increased interest in the problem of individual differences in the schoolroom, together with the use of standard tests to evaluate instruction, have alike led naturally to the use of tests for locating class weaknesses. Teachers, supervisors, and principals, upon discovering that instruction in certain subjects was not up to standard as compared with norms, immediately wished to know in what respect it was lacking or inadequate.

Creation of diagnostic examinations. The survey type of test, though, while in a way throwing some light upon such questions, was not particularly adapted for use in diagnosis. Within the past few years tests permitting more of detailed diagnosis have been devised, but even these can hardly be expected to fit all courses of study or texts used, or even quite closely to any one of them. The item of expense, too, has not added to the popularity of the new diagnostic tests. What is happening now is that teachers are rapidly learning the fundamentals of test construction and diagnosis, and are themselves constructing diagnostic examinations which are

peculiarly adapted to diagnose outcomes in the instruction which they are giving.

Many teachers to-day, as a result, are replacing the old two-phase cycle of teach-test, and teach-test, with a four-phase cycle of teach-test-diagnose-reteach. Just how much reteaching or remedial work, or, looking at it from the angle of the student, just how much "relearning" need be done, depends upon two factors: the number of items which the results of diagnostic testing show have not yet been mastered and the relative importance of these topics.

In the school not everything may be actually mastered. There must be relative emphasis. The time actually required to reach a desired level of mastery in a given activity is frequently out of proportion to the value of such mastery. Yet there are many habits, skills, attitudes, ideals, interests, or items of information which should be definitely and thoroughly acquired by each individual. If ordinary instruction and application does not result in certain of these, additional instruction and application must be applied to them. The items of deficiency are in most instances, to a very considerable extent, individual.

Analysis of written test results. In an article in the *School Review* for April, 1923, Peter L. Spencer, of the University of Oregon High School, describes a procedure in diagnosis and remedial teaching which was carried out in his classes in first-year algebra. At appropriate intervals, as at the conclusion of a topic or principle, a test was devised to so cover the work of the unit that there would be at least one exercise to test each step or procedure just taught. The test consisted of such "type problems." The tests were hektographed, given, and scored. Mr. Spencer says, "This is where the usual examination stops, but it is where the diagnostic examination begins." A chart was constructed, such as is reproduced on page 479, which facilitated the tabulation of the various types of errors.

DIAGNOSIS CHART FOR MULTIPLICATION AND DIVISION¹

PUPIL	SCORE	MULTIPLICATION						DIVISION		
		Polynomial $\times$ Monomial	Fractions ()	Polynomial $\times$ Polynomial	() () + () ()	() () - () ()	Equations	Polynomial $\div$ Monomial	Polynomial $\div$ Polynomial	Fractions
1.....	100	.....	.....	.....	.....	.....	.....	.....	.....	.....
2.....	93	.....	.....	.....	.....	.....	1	.....	.....	.....
3.....	79	.....	.....	.....	.....	1	.....	.....	.....	2
4.....	72	.....	1	.....	.....	.....	.....	.....	.....	2
5.....	72	.....	.....	1	.....	1	.....	.....	.....	2
Total errors.....		11	2	11	15	17	21	14	21	28
Possible errors.....		54	27	27	27	27	54	54	54	54
Wrong signs.....		3	0	6	7	11	10	2	4	12
Fundamentals of arithmetic.....		5	2	4	1	5	1	1	2	3

The value of such a chart is easy to underestimate. The general practice of basing remedial procedure only upon information picked up incidentally to teaching is not sufficient. Such information is most likely to be incomplete or a poor sample, lacking in perspective, and not of sufficient vividness. Unless more complete and more representative sampling is done, and the results are recorded in some systematic manner, the diagnosis is very likely to be misleading.

From such a tabulation as is shown on this page, it is a simple matter to determine the extent of mastery by the class, and by each individual in it, of the topic upon which the test is given and also to determine upon what items or elements of procedure the class is short as regards mastery. One can also ascertain from the tabulation upon just what items or elements each individual has fallen short of mastery,

¹ Reprinted by permission of publishers, The University of Chicago Press.

and to what extent and in what items previous preparation has been short of mastery that is adequate.

Remedial instruction. On the items which do not seem to have been mastered by the large majority of the class members, class instruction and drill may now be prescribed. These items will be relatively few, if the teaching has been well done. The remedial work should be largely individual. An advantage of the chart lies in the ability to give an objective and convincing demonstration to the pupil of his particular weakness. To quote Mr. Spencer:

The correction of individual difficulties was accomplished during the supervised-study period, when the teacher took up, with each pupil who needed attention, the particular work on which he had failed. In these periods several methods were used. Sometimes the pupil was assigned a definite set of problems. Again he might be given special drill-cards, which the teacher had made out in advance and arranged to emphasize the type of problem with which he was having difficulty. Occasionally the mistake was merely pointed out and explained. When a pupil could not be reached by any of these methods, he was allowed to observe while another pupil solved his problem. In this way he could get the "swing of it," and was then ready for a drill card.

A "check test" may be given at the end of the period of remedial work. This test, which serves to evaluate the remedial work, and as a check on the original test for those students who apparently had mastered the work in the earlier test, should be devised to be much like the first one given. It should follow the same procedure, but with different problems, corresponding to those of the first, type by type. In some instances additional remedial work would not be prescribed. Those students who seem to need no remedial work may be allowed, as was done in Mr. Spencer's classes, to work ahead of the class as individuals. Doing this, some have completed additional topics, while others have gained as much as a semester in a year. All have,

without doubt, profited by the training resulting from thinking things through for themselves and managing their own activities, rather than depending upon class instruction. These pupils very likely should continue to take the remedial tests, lest enthusiasm, in the case of some, obscure reality.

Use of such procedures becoming more general. The diagnostic examining and prescription of remedial work just described may be carried on in all subjects taught in the junior and the senior high school. Diagnostic tests which bring into relief the degree of mastery of individual facts, formulæ, or principles in physics or chemistry, or of any science for that matter; of the dates, events, movements, men, causes, effects, institutions, problems, and developments in history; of vocabulary, declensions, conjugations, word-order, rules for cases, and idioms in language study, may likewise be devised, and remedial instruction in these subjects be prepared and presented.

The use of these newer methods of individual diagnosis and remedial teaching has been fairly general in our better elementary schools. *Measuring the Results of Teaching*, by Walter S. Monroe, Director of the Bureau of Educational Research of the University of Illinois, was devoted largely to the use of the then-available standard tests for the purpose of diagnosis, and to the technique of remedial teaching in the elementary school subjects. Among the more recent standard tests may be found a considerable and a steadily increasing number of diagnostic tests. Of this type are the diagnostic scales and score cards for handwriting devised by Professors Freeman and W. C. Reavis, of the University of Chicago, and Professor C. T. Gray of the University of Texas; the Charters's Diagnostic Language Tests; the Spencer and the Monroe Diagnostic Tests for Arithmetic; and the Douglass Diagnostic Tests for First-Year Algebra.

Other procedures of analytical diagnosis. Miss Ruth Strietz, of the Bureau of Research of the University of Illinois, points out in a recent bulletin that there are at least two other usable methods of analytical diagnosis. These she lists as:

1. Observation of the pupil in normal daily work, as observing the student at the blackboard in the algebra class as he performs the exercises assigned; watching for possible causes of his inability to complete such exercise correctly; noting the nature of the difficulty, as wrong signs, misuse of exponents, etc.; and studying the pupil in the history class to note his method of study, whether any plan of organization is used, or use is made of index, references, etc.

2. The oral "slow-movie" method; that is, asking the student in difficulty to explain how he came to his erroneous conclusion; for example, asking how he got the erroneous meaning from the text, or why he finds xy and xy to be $2xy$, and thus studying the mental processes of the student in performance for clues leading to the cause of difficulty.

V

Homogeneous or "speed" grouping. An increasing number of high schools are to-day employing some plan of grouping pupils, registered for the same year-subjects, into sections based on their ability to do. While the benefits to be derived from such grouping have not as yet been fully determined, the plan is being advocated by those who have given it careful study. No doubt the next few years there will be produced objective and quantitative data, based on carefully controlled scientific experiments, from which the relative effectiveness of the plan can be fairly accurately determined. Such data should go far to settle, not only the question of the value of sectioning on the basis of ability for

subjects generally, but its relative effectiveness for the different school subjects as well. As it is, there are those who, while admitting the economy of sectioning in such subjects as mathematics and foreign languages, are inclined to doubt that it serves equally well in others, as science and history.

Where the plan has been used, the almost uniform result has been that the more favored students have been able to accomplish considerably in excess of the work done by the usual unselected class, and that the less able students, while attempting to cover less, more nearly mastered what they attempted. There was, in consequence, a very materially reduced percentage of failures.

Advantages of homogeneous grouping. The following advantages are attributed to homogeneous grouping by those who have employed the plan:

1. The nature of the work may be better adjusted to the ability of the bright, and training may be offered in methods of independent attack.
2. Individual attention can be given to small slow-groups.
3. The time of brighter students is not wasted in listening to explanations to slow pupils, and their interest in the subject is not thus dulled.
4. There is an incentive to get into and stay in the upper groups.
5. Fewer failures result, and elimination is reduced.
6. Initiative on the part of brighter pupils may be better developed.
7. Slow pupils, heretofore forced to the background by the presence of abler pupils, now participate more aggressively and gain in confidence.
8. Competition in bright groups spurs on pupils who otherwise rest on their oars.
9. Better opportunities are provided for discovering students of near-genius ability.
10. The nature of the work and the teaching methods employed may be adapted to the needs of both the slower and the brighter pupils.

Dangers and limitations. Friends of homogeneous grouping, it should be said, as well as its critics, have been prompt to point out certain dangers against which precautions must be taken, and certain limitations of the plan which must be recognized. Among these are:

1. Ambitious pupils may injure their health from overwork.
2. The slow students need the presence of some able students as concrete evidence that the tasks assigned are not too difficult.
3. The frequent transfer of students from section to section calls for increased office and clerical work.
4. Teachers are unable or do not have time to differentiate the work for the different levels.
5. The stigma attached to being in the slow section is undesirable, and operates to discourage the slow pupil.
6. Sectioning usually results in dissatisfaction of parents, who do not like the distinction of having their children placed in the slower sections.
7. Pupils transferred to a lower group tend to lose interest.
8. Sectioning involves difficulties of programming which are not to be ignored, even in the larger schools, and which make its use impractical in the smaller ones.
9. Teachers object to having the slower groups, and object to the increased burden of preparation attendant on having several sections of differing levels, rather than the traditional assignment of several sections requiring but one common preparation.
10. Textbooks are not available for differentiated instruction.
11. Bright pupils go through school too rapidly, and in consequence graduate too young.
12. Teachers will tend to underestimate the work of the lower students of the bright sections, and to overestimate that of the better students of the slow sections.

So far in most schools the administration has not seen fit to section classes. In small high schools where there could be at most but two or three sections the difficulties of programming are considerable, if not insuperable. Because of these considerations, homogeneous grouping into two or

more recitation sections will not be a possibility for many teachers. Under such circumstances, whatever provisions are made for individual differences must be effected within the recitation section. Recognizing this, many teachers have divided a single recitation section into two or more groups, on the basis of rate of progress.

The writer has visited a number of classes where grouping within the section, on the basis of achievement, was being carried on successfully. In the University of Oregon high school some of the classes in French are divided into groups — sometimes as many as five or six groups of students of like ability — consisting of three to five students each. Each of these constitutes a social group and a teaching unit, and each makes progress according to its respective ability. The instructor directs the work of all divisions, supervising their progress and lending assistance and encouragement. At appropriate stages in the subject-matter, tests are given to check up on the results. The test serves as an incentive to much very purposeful and effective self and mutual teaching. The plan lends itself best to either grammar or translation types of work, though in the first-year classes there appears need for more teacher instruction than is the case later on, and the advantages over class instruction are less obvious.

The more common plan, however, is to divide a class into two or three sections. This may be done by means of an intelligence test, a standard test in the subject concerned, the previous marks of the students in the subject, or a combination of two or more of these. While probably some increased accuracy is obtained by using intelligence tests, especially in the instances of transfer students or for students beginning a new subject, the superiority of such is not sufficient to prevent teachers from using the final marks of the student in other courses of a similar nature. In any

case, readjustment probably will have to be made from time to time on the basis of the progress of individual students.

Technique of sectioning. There are a number of factors which have a bearing on the ability of a student to learn rapidly and with safety, and which might be considered when dividing a group of pupils into different class sections, or into sections within a recitation class. Among these are general intelligence, aptitude and willingness to work in the subject concerned, outside interests and demands on time, and general health and physical fitness.

The first of these variables can be measured by means of an intelligence test. If an individual test is to be used, the Stanford Revision of the Binet-Simon tests is recommended. Results obtained in a group test are fairly dependable, though, for this purpose. The Terman Group Test for Grades 7 to 12, or the National Intelligence Tests is recommended, if group-test results are to be used. From the scores on these tests two important measures of mental ability may be obtained — the M.A., or Mental Age, and the I.Q., or Intelligence Quotient. The mental age of a pupil is that age at which normal pupils make the score made by the pupil in question. It is possible for a pupil to make a score which is typical for an individual two or three years older or younger than the pupil actually is chronologically. Two pupils may be eleven years old mentally, and yet one be much brighter, being several years younger chronologically than the other. The intelligence quotient (I.Q.) is the quotient obtained by dividing the mental age of a pupil by his chronological age, that is, $I.Q. = \frac{M.A.}{C.A.}$. Thus a pupil twelve years of age, who makes a score of a normal ten-year-old child, will have an I.Q. of $\frac{10}{12}$ or .83. Mental age is a measure of mental maturity; the I.Q. is a measure of natural

brightness. A pupil may have a fairly low I.Q., and yet a fairly high M.A. because he is older. Both mental maturity and brightness should be taken into consideration when dividing a class into sections, unless the chronological ages of all the pupils are about the same. If a class is scattered in chronological age over a range of five or six years, or even four or five years, it is a much more accurate procedure to use both. The simplest way to average M.A. and I.Q. is to rank the class first as to mental age, next as to I.Q., and then to average these ranks. These averages may then be ranked.

The final ranking thus obtained should then be averaged with a measure of the second factor mentioned above, namely, aptitude and willingness to work. This is best shown by the results of a standard test over the work of the previous semester in the subject concerned, by the semester grade in the subject, or by an average rank in the two. The pupils should then be ranked on the basis of this measure of school achievement. The average of this rank, and the final average rank obtained from the intelligence tests, furnish the data for the final ranking for grouping. The groups may then be selected from these final ranks.

It is impractical to attempt to incorporate into the ranking the other two factors mentioned — other demands on time and energy, and health or physical fitness — because of the inability to measure them definitely. A sensible procedure is for the teacher to give consideration to these factors in determining to which group border-line cases shall be assigned.

Summary of technique. While the above procedure seems rather complicated, in actual practice it is quite simple. The steps may be summarized, as follows:

1. Give and score intelligence tests, absolutely according to directions, to all pupils concerned. These should be studied thoroughly first.

2. Calculate and record for each pupil his M.A. corresponding to the score made. Tables for doing this are found in the manual provided with the tests.
3. Determine the I.Q. of each pupil by dividing his M.A. by his C.A. Both M.A. and C.A. should first be reduced to months.
4. Rank pupils in the order of their M.A., the oldest first.
5. Rank pupils on basis of their I.Q., the brightest first.
6. Calculate average rank for each pupil in these two characteristics.
7. Rank pupils on the basis of some standard achievement test, as the Henmon Latin Tests for Latin classes, or on the basis of their next previous semester grade in the subject concerned, or on both. If both are employed, determine the average rank as in 6.
8. Calculate the average rank from ranks obtained under 6 and 7.
9. Assign students to divisions or sections on the basis of these final average ranks, putting pupils of smallest average rank in the rapid division or section, and those of largest average rank in the slow division or section. Pupil health and outside work are to be considered in border-line cases.

The description of the full technique given above represents the best procedure where careful division is desired. Quite often this is neither possible nor necessary. In such cases a rough division, based on school grades alone, will serve fairly well. The average marks made in all studies during the previous semester may be substituted for the intelligence scores, and the ranks of students in these may be used instead of the average rank obtained under step 6 above. The division may also be made entirely on the basis of the previous semester's work in the subject, though this is not so accurate. In averaging letter grades, the simple device may be used of counting A+ as 1, A as 2, A- as 3, and so on. The ranking may then be done by counting as rank 1 the pupil having the lowest average, rank 2 that one having next lowest average, and so on.

Differentiated instruction. The teaching of the various

groups, after sectioning has been effected, may be handled in a number of different ways. The two most commonly used plans are:

1. *The progress plan*, which permits each group to travel through a standard course of study at its optimum pace, and thereby varies the time required to finish the course to the capacity of the child.

2. *The concentric plan*, which restricts all groups to a common rate of progress, but enriches the course as it is covered by each of the sections superior to the slowest, which is restricted to the barest essentials. This enrichment consists of additional work of somewhat increased difficulty, and requires somewhat higher standards of accomplishment. The "concentric" plan is so called because of its resemblance to several concentric circles, as is shown in the following diagram.

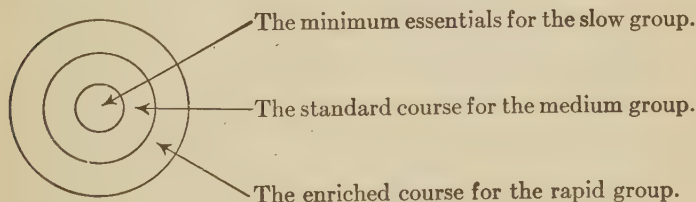


FIG. 4. THE CONCENTRIC, OR THREE-TRACK COURSE

Through the use of this plan all students in a section find themselves traveling along at the same rate, differing only in the "extras" and "side-trips," and thus the complications which would result from classes doing less or more than an even "year's work" in a subject would be avoided. In algebra, supplementary topics and additional problems of increasing difficulty may constitute the extras; in geometry, more originals and special problems or projects of application may be employed; in a foreign language supplementary

reading material in the foreign language, or reading material regarding the country and its people may constitute the additional tasks. In some instances composition in the foreign language, or conversational exercises could be utilized. In history and literature no end of variety of materials may be suggested — as broad as the possibilities in supplementary material — the brighter students reading more intensively about men, movements, and institutions than the less capable. In science additional topics, supplementary material, and additional laboratory projects and investigations are possible.

Comparative values of the two plans. There is no agreement that either of these two types of adjustment is superior to the other. Each possesses advantages. In favor of the progress plan it may be said that:

1. The satisfaction of doing more than the usual work in a given time operates as an incentive to effort.
2. It does not require the differentiation of assignments, and the consequent cost in time and ingenuity on the part of the teacher.
3. The time required for brighter students to complete the high school course may be reduced.

In favor of the concentric plan, it may be said that:

1. Adjustment which is psychological must take into consideration increased difficulty, as well as increased rate.
2. Bright students do not find themselves, at the close of a year, in the middle of a semester's work or a logical unit of subject-matter. This obviates the confusion likely to result where the first plan is used.
3. Additional credit may be given for any increased amount of work, so that the brighter students may gain time, as in the other plan.
4. The satisfaction resulting from doing the extra work, which often is more interesting than the minimum essentials, is an incentive to effort.

Adjustment of technique for differentiated instruction. Regardless of which plan for differentiated instruction is employed there are certain suggestions for the adjustment of the technique of instruction which should be kept in mind.

The bright group will need less drill and less explanation, and less illustrative material will be required. The older authoritative methods in teaching, such as the lecture and the use of assigned reference books, can be used to better advantage with this group than with the slow pupils. Developmental methods, such as the inductive development of rules, are not as necessary for understanding and retention. Assignments will need less explanation. More discussion and less recitation may be used. More use of the socialized recitation with the bright group is recommended. In the right section, recitation in the narrow sense of the word may in many instances be omitted entirely.

The slow section, on the other hand, requires more drill in class and more review work. The assignments must be well explained and emphasized. Assignment notebooks are recommended, in which assignments may be written verbatim. Study questions are helpful. Closely supervised study should be provided for. Individual help, conferences, diagnosis, and encouragement are needed. Much illustrative material of a visual sort should be used. Much use of developmental methods, of projects, and activity methods should be made.

The most serious obstacle in a plan of homogeneous grouping with time recitation for each group, is the division of the recitation and discussion time between the groups. If three groups are formed, and three separate recitations are carried on in a forty-five minute period, an average of fifteen minutes only is available for each section. This plan is not frequently carried on on this basis where there

are more than two groups. Where three or more groups are differentiated, the provision for differences usually takes the form of the flexible assignment, as was described in a preceding section of this chapter. All students then participate in a common recitation, but pupils within the different sections are held for the successive reaches of work.

VI

Individual instruction. Like most other such questions, there is something to be said on both sides of the question of individual instruction, and its usefulness in dealing with the problem of individual differences in school pupils. The more important advantages claimed for individual instruction are:

1. It permits the slow child to progress at his own rate, thus permitting of thoroughness and preventing discouragement.
2. It prevents that illusion of making progress when it is not really made, that misleads so many slow or indolent children under class instruction.
3. It tends to concentrate the attention of the pupil on his own individual achievement, upon which his progress through the course of study depends, instead of upon the average progress of the class.
4. It tends to focus attention upon the mastery of subject-matter and upon educational growth, and away from perfunctorily satisfying demands imposed by the teacher.
5. It permits the more able pupil to make progress at his optimum rate, and thereby realize upon his peculiar gifts.
6. It tends to eliminate that undesirable training for the gifted child which results from being held down to the pace of the average, and which tends to generate habits of idleness and attitudes of satisfaction with achievement that are less than capacity.
7. It permits of personal contacts of pupil and teacher, for which the "pupil-tutor" situations are much more favorable than "teacher-class" situations.

8. It permits of valuable exercise of individual initiative, especially on the part of the more capable pupil, who now is supervised as closely as the slow or the mediocre ones.
9. It tends to reduce retardation and to prevent the elimination of the slower pupils.

On the other hand, the following arguments may be advanced in favor of class or group teaching:

1. It provides better for very important educational outcomes, such as skill and habits of coöperation, skill in oral discussion, development of ideals from social situations, and other social attitudes, ideals, skills, and habits necessary as training for future participation in family, community, business, national life, and in civic, commercial, or recreational activities. These may be developed much better in class teaching than where individual instruction is employed.
2. The mutual stimulus to activity which comes from group activity — competition, friendly rivalry, desire for good opinion of one's fellows and for excelling them, and encouragement resulting from their achievements — is not possible under the individual plan.
3. The group plan stimulates effort through discovery of problems and the development of interest in the class discussions.
4. The group plan is valuable because of the opportunity for the slow to learn from the recitations and discussion of the others.
5. The group plan makes unnecessary duplicate explanations, whereas under the class plan one explanation or set of instruction serves for all.
6. The individual plan involves too much teacher-time in planning work for the different individuals, and in keeping track of the progress of individuals.
7. The individual plan requires a type of teacher having a more thorough mastery of subject-matter, and who is a keener student of human nature than is the average high school teacher.

Older plans. In the early days of our educational history all instruction was by the individual method. The pupils learned their lessons at their seats, and then went up

to the teacher's desk to recite to him. For forty years there has been a definite, though not at all a general, movement, in the direction of making some return to individual instruction. Under Search, at Pueblo, Colorado, some thirty years ago, the high school pupils made progress in every subject at their optimum rate. For a quarter of a century the late President Frederick Burk, of the San Francisco Normal School, protested against the "lock step" in school work, advocated individual instruction, and tried to demonstrate its usefulness in the training school of that institution. Several of his pupils have experimented with the plan in other schools, with varying degrees of success. Most prominent of these attempts has been that of Superintendent Carleton Washburne, at Winnetka, Illinois, using the plan in elementary schools only.

Search, in describing the achievement of the members of a Cæsar class, relates that in the same time one pupil completed 140 chapters satisfactorily, while another was able to do only 40 and another but 45. Search also reports that the work done in Cæsar by the brighter students was of a much more thorough type than that usually done by the slower students. One does not have to stretch one's imagination to believe that similar situations might occur in almost any typical language class of normal size and distribution, or for that matter in classes of any kind.

Merits and defects. All plans of this type have features of distinct merit, as well as rather serious shortcomings. The outstanding serious difficulty with such a method, and the chief cause of the collapse of the individual plan as proposed by Search, is the tax put upon the ingenuity and resourcefulness of the teacher to keep track of twenty-five or thirty pupils, all progressing at various rates. Where teachers are teaching five or six such classes daily, it is almost impossible, even when aided by intricate bookkeeping schemes, to handle such instruction.

Some subjects lend themselves better to individual methods of instruction than do others. Mathematics and foreign languages perhaps, after the first year, provide a more favorable opportunity than do the content subjects — natural and social sciences, and literature and history. This is true because of the importance of discussion and group opinion in the latter subjects, and the renewed interest resulting from such discussion, whereas the need for discussion is not so marked in instruction in the form subjects.

In small classes, and particularly in small advanced classes, individual instruction may be carried on with a minimum of extra difficulty to the teacher, and with much profit to members of the class. It may be possible for the brighter students here to do three semesters' work in a year, or for that matter in some cases the work of two semesters in one. The slowest students, who ordinarily would fail to pass the course, may complete satisfactorily a semester's work in a year.

Parker suggests individual work for the brighter students by excusing them from recitations and permitting them to use such time for further progress. These students usually or frequently come to class with the others, but work on, independently of the recitation. What special help these students require is given them in the supervised-study period. They usually are able to make extra credits. Noticeable and valuable by-products are an increased ability to direct one's own efforts and study, and an increased responsibility assumed for one's own educational progress. As Parker pointed out, the brighter and more industrious students have gotten "all the meat out" of the assigned work, and the sitting through the recitation, while sometimes in a small degree fruitful, is for the most part marking time — a situation conducive to bad order and the development of habits of resting on one's oars.

The Dalton plan. Within recent years much has been written about a new form of individual instruction which has become known as the Dalton plan, taking its name from the city in Massachusetts where it was originally worked out. While the original Dalton plan for individual instruction cannot be carried to completion without considerable administrative reorganization of the entire high school, it is based upon principles and employs a technique with which every teacher should be familiar.

Under the Dalton plan the work of the year is divided into and laid out in monthly units. At the beginning of the term the student is furnished with his monthly assignments — called “contracts” — for each subject carried. As soon as all contracts are completed in all subjects, contracts for the second month in all subjects are given him. In these contracts detailed information as to topics, problems, exercises, written work, references, memory work, and standards are given.

There are no recitations as such. All classrooms are “laboratories,” to which pupils may go at will to work under supervision on contracts. Presiding over these are the instructors, who preserve an atmosphere of work and study and give assistance needed in explanations of items in the contract, in the use of the departmental equipment, and in attacking particular problems. The instructors also explain difficult points, processes, and principles, when necessary. The student works on any contract at any time in the appropriate room, and as long on any contract as he pleases. Group conferences are held as they seem desirable. In some schools using the plan regular recitation groups meet regularly once or twice a week. Group discussions and explanations are carried on at these times. Objective and definite means for checking the progress of the students characterize the plan. This is done by graph record cards.

Each student keeps one type of these for each subject, and the instructor keeps another type for each "recitation" group. Upon these are recorded the progress of each pupil in each subject as made.

The outstanding features of the plan may be said to be:

1. Individual progress of each student in each subject.
2. The direct responsibility of each student for his own progress.
3. Opportunity for initiative in planning, and carrying on to completion the contract assignments.

Peculiar limitations to the plans, in addition to those common to all plans of individual instruction, are:

1. The opportunity for the irresponsible pupil to lag.
2. The necessity, on the part of each instructor, for very careful organization of all courses and the formulation of contracts.
3. The opportunity for mutual help among pupils, which may not always be used to advantage.

A number of schools are to-day employing the plan, or some modified form of it. The most common modifications are the provision for more group conferences, and the use of a laboratory schedule for each pupil. In some schools the pupils follow a regular schedule of classes, just as is ordinarily done in high schools, but employ the contract idea and spend the time of the class period largely in "laboratory" (supervised study) activity.

QUESTIONS AND EXERCISES

1. Is it true that students differ in special aptitudes, or is a student lacking in aptitude in a given subject likely to be lacking in aptitudes for all subjects?
2. With what provisions for individual differences have you had experience as a student, or as a teacher? How did such provisions succeed?
3. Is it true that people differ as to preferred modes of sense-impression, some being visualizers, some audiles, some motiles, etc.?
4. What are the causes for variations among individuals in intelligence and aptitude for school subjects?

5. What are the arguments for and against variable student programs?
6. Should credit toward graduation be offered for participation in student activities?
7. Which lends itself best as a device for providing for individual differences, for your teaching subject — the progress plan, or the concentric plan?
8. Write out a flexible assignment of three levels for some high school subject.
9. Devise a diagnostic test for a week's work in some high school subject, for the purpose of locating individual difficulties. Devise also a recording chart for displaying the errors of the individuals and the class.
10. What suggestions for providing for individual differences can you offer, other than those mentioned in the chapter?
11. Work out a scheme for giving individual remedial instruction, as based on the results of diagnostic testing.
12. Suppose that the classes in your department were divided into three sections, according to ability. How would you differentiate the instruction?
13. Divide the following hypothetical class into three sections of slow, medium, and bright pupils:

Number of pupil	1	2	3	4	5	6	7
C.A.	16.5	14.3	16.0	13.2	14.0	13.2	14.4
M.A.	14.3	14.9	13.0	14.5	16.7	13.2	17.2
Test score	41	61	58	54	47	53	55
	8	9	10	11	12	13	14
	12.9	15.6	14.3	13.2	15.6	16.1	14.3
	14.6	13.2	16.3	17.2	14.3	12.3	13.9
	58	62	63	71	73	64	61
	15	16	17	18	19	20	21
	15.2	13.8	12.9	14.2	15.6	14.7	15.8
	14.5	16.3	13.4	12.8	14.7	13.8	12.7
	53	42	51	53	55	56	47

14. Write a paper of 500 words on "Individual Instruction in History," or substitute for history whatever subject you wish to discuss.
15. Evaluate the Dalton plan as it would be applied in your teaching subject.

SELECTED REFERENCES

Breed, F. S. "Shall We Classify Pupils by Intelligence Tests"; in *School and Society*, vol. 15, pp. 406-09. (April, 1922.)

General discussion listing a number of principles, cautions, conditions, and steps in using intelligence tests.

Bush, Emma D. "An Experiment in Varying Methods of Teaching to Bright and Dull Sections of the Seventh Grade"; in *Journal of Educational Research*, vol. 8, pp. 113-21. (September, 1923.)

Practical suggestions for teachers of history and geography.

Buswell, G. F. "Instruction in Mathematics for Gifted Pupils"; in *Pedagogical Seminary*, vol. 24, pp. 569-83. (December, 1917.)

Gives the results of a questionnaire on provisions for bright children. A bibliography.

Buswell, G. F. "The School Treatment of Mentally Exceptional Children"; in *Elementary School Journal*, vol. 23, pp. 683-93. (May, 1923.)

Discussion of plans of providing for mentally exceptional children, favoring modification of curriculum and varying methods of work rather than varying the rate of progress.

Carleton, E. F. "Is It Well with the Child"; in *Journal of Education*, vol. 101, pp. 94-98. (January, 1925.)

Comprehensive discussion with historical background; discusses the Winnetka and Dalton plans.

"Classroom Problems in Education of Gifted Children"; in *Nineteenth Yearbook of the National Society for the Study of Education*, 1920.

Part II. Pp. 126. Especially Chapters VII and VIII. Bibliography.

Clarke, F. E. "The Arlington Plan of Grouping Children According to Ability"; in *School Review*, vol. 25, pp. 26-47. (January, 1917.)

Descriptions of plan used for six years with advantages and objections.

Cubberley, E. P. *Public School Administration*. Boston: Houghton Mifflin Co., 1916.

Chapter XVIII, "Adjustments and Differentiations." Contains a brief, concise outline of a number of promotional plans allowing for individual differences.

Cubberley, E. P. *The Principal and His School*. Boston: Houghton Mifflin Co., 1923.

Chapter XIX, "Classifying and Promoting the Pupils."

Dewey, Evelyn. *The Dalton Laboratory Plan*. New York: E. P. Dutton Co., 1922. 341 pp.

A fairly comprehensive and readable description of the Dalton plan.

"Education of Gifted Children"; in *Twenty-Third Yearbook of the National Society for the Study of Education*, 1924.

Part I. Pp. 443. Especially Chapter VI. A curriculum for gifted children; and pp. 302-88, practical suggestions for different high school subjects.

Freeland, Geo. E. *Modern Elementary School Practice*. New York: The Macmillan Co., 1919. 468 pp.

Chapter XIV, "The Individual Social Balance"; Chapter XV, "Methods of Adjusting School Work to Individual Needs."

French, W. C. "A Plan for Taking Care of Bright Pupils"; in *Elementary School Journal*, vol. 24, pp. 103-08. (October, 1922.)

A description of a plan used by teachers in Drumwright, Oklahoma, Junior High School.

Gates, Arthur I. *Psychology for Students of Education*. New York: The Macmillan Co., 1924.

Chapter XVII, "The Nature of Individual Differences." Aims, character, causes of individual variations.

Hughes, W. H. "Provision for Individual Differences in High School Organization and Administration"; in *Journal of Educational Research*, vol. 5, pp. 62-71. (January, 1922.)

Homogeneous grouping may not be desirable in some communities. Supervised study considered.

Hughes, W. H. "Standardizing Procedure in a Combination System of Supervised Study, Varying Scope of Work and Weighted Credit"; in *Journal of Educational Psychology*, vol. 2, pp. 547-56. (September, 1912.)

Description of methods used at Antioch, California, for providing for individual differences.

Inglis, A. J. *Principles of Secondary Education*. Boston: Houghton Mifflin Co., 1918.

Chapter III, "The Secondary School Pupil — Individual Differences." Good discussion of causes, extent, nature, and implications of individual differences.

Jackman, G. B. "The Dalton Plan"; in *School Review*, vol. 28, pp. 688-96. (October, 1920.)

A brief description of the plan in operation at Dalton, Massachusetts, written by the principal of the Dalton High School.

Kearney, Julia F. "Teaching and Following-up Supernormal Children in a Small Public School"; in *Journal of Educational Research*, vol. 7, pp. 145-48. (February, 1922.)

Describes enrichment of curricula for a class of twenty-seven boys of high I.Q. in a New York public school.

McDonald, Laura Andrews. "English for the Inferior Section of the Ninth Grade"; in *English Journal*, vol. 12, pp. 610-16. (November, 1923.)

Special difficulties and methods in teaching less able pupils.

McGillivray, M. E. "Diagnosis by the Aid of Tests of the Ability of High School Students in English"; in *School and Society*, vol. 20, pp. 476-78. (October 11, 1924.)

McGraw, H. W. "The Use of Test Data as a Basis for Drill in Grammar"; in *Journal of Educational Research*, vol. 10, pp. 291-96. (November, 1924.)

Suggestions on how to base remedial instruction on test data.

Miller, H. L. *Directing Study*. New York: Chas. Scribner's Sons, 1922.

Pp. 144-72, a discussion of the intermediate or flexible assignment, and abundant illustrations in high school subjects.

Miller, H. L., and Johnson, Dorothy. "Directing Study for Mastery," in *School Review*, vol. 30, pp. 777-86. (December, 1922.)

Practical description of actual classroom application.

Nichols, M. L. "The Teaching of Science to Classes Divided According to Ability"; in *Ninth Annual School Week Proceedings, University of Pennsylvania*, vol. 23, no. 1, pp. 324-26.

Description of different methods of teaching, used in science classes in South Philadelphia High School for girls, divided according to results of intelligence tests.

Odell, Charles W. *An Annotated Bibliography, Dealing with the Classification and Instruction of Pupils to Provide for Individual Differences*. Urbana, Illinois: University of Illinois Bulletin, vol. 21, no. 12, November 19, 1923. 150 pp.

Parker, S. C. "Adapting Instructions to Differences in Capacity"; in *School Review*, vol. 25, pp. 20-30. (September, 1924.)

Parker, S. C. *Methods of Teaching in High Schools*. New York: Ginn & Co., 1915.

Chapter XV, "Adapting Class Instruction to Differences in Capacity."

Parkhurst, Helen S. *Education on the Dalton Plan*. London: G. Bell & Sons, 1922. 222 pp.

A complete description of the Dalton laboratory plan of organization for individual study and progress.

Peckstein, L. A., and McGregor, A. L. *Psychology of the Junior High School Pupil*. Boston: Houghton Mifflin Co., 1923.

Chapter XV, "Instructional Differences Corresponding to Ability Grouping."

Prouty, Clarissa E. "An Experiment in the Use of the Dalton Plan"; in *Elementary School Journal*, vol. 24, pp. 599-607, 679-91. (April and May, 1924.)

A clear and brief description of the Dalton Plan.

Reeve, W. D. "Homogeneous Grouping of High School Students by Means of Psychological Tests"; in *Fourth Yearbook of the National Association of Secondary School Principals*. Wisconsin: Banta Publishing Co., 1921.

Pp. 81-94, arguments and plans for selecting upper and lower ten per cent for special instruction.

Search, P. W. "Individual Teaching — The Pueblo Plan"; in *Educational Review*, vol. 7, pp. 154-70. (February, 1897.)

A short description of the plan of individual instruction, as carried on by Superintendent Search and his teachers in Pueblo, Colorado.

Siders, W. R. "In Class Instruction How Can the Individual be Reached"; in *Proceedings of the National Educational Association*, 1909. Pp. 175-82.

Describes combined class, group and individual instructional system used at Pocatello, Idaho.

Spencer, Peter L. "Improvement of Teaching by Means of Home-Made Non-Standardized Tests and Remedial Instruction"; in *School Review*, vol. 31, p. 276. (May, 1923.)

An illustrative description of procedure for individual diagnosis in algebra.

Starch, Paul G. *Educational Psychology*. New York: The Macmillan Co., 1919. 474 pp.

Chapter III, "Variation of Human Capacities."

Stetson, Paul C. "Homogeneous Grouping in the First Year of a Five-Year High School"; in *School Review*, vol. 29, pp. 351-55. (May, 1921.)

Describes and evaluates procedure of Muskegon, Michigan, where pupils were classified into three groups on the basis of ability.

Streitz, Ruth. *Educational Diagnosis*. Urbana, Illinois: University of Illinois, 1924. 24 pp. University of Illinois Bulletin, vol. 21, no. 41. Bureau of Educational Research Circular no. 27.

Types of diagnosis.

Thorndike, E. L. *Principles of Teaching*. A. G. Seiler, 1906.

Chapter VI, "Individual Differences." One of the best short treatments of nature and extent of individual differences.

Tummer, Mary C. "Instruction Adapted to Group of Differing Ability"; in *School Review*, vol. 30, pp. 409-11. (June, 1922.)

Describes accommodation and express classes, opportunity, adjustment, and make-up groups in a Los Angeles High School.

CHAPTER XVI

THE TECHNIQUE OF CONTROLLED CLASSROOM EXPERIMENTATION

1. *The classroom teacher and experimental work:* The teacher's responsibility and opportunity for experimentation — Experimental work and promotion — Need for experimental investigations — Unsolved problems in education — An illustration of scientific fact finding.
2. *Technique of a controlled classroom experiment:* The problem — Conditions of the experiment — Technique of selecting groups of equal ability — Measuring the results — Conclusions from the experiment.
3. *Types of controlled experiments and their technique:* The equivalent-group method — Technique of the equivalent-group method — Experiments with one group — Technique of the one-group method — The rotation method — Cautions as to the use of the rotation method — Comparison of the three procedures — Essentials of technique.

Questions and exercises — Selected references.

1. *The classroom teacher and experimental work*

The teacher's responsibility and opportunity for experimentation. Without question, the primary function of the classroom teacher is to teach. This function should not be permitted to suffer by the intrusion of other activities; yet progress and improvement in teaching skill and methods can be carried only so far without definite experimentation. Just as has been true in agriculture, in business, in medicine, and in other fields, progress in teaching has been dependent upon experimentation and the consequent development of new methods. To be sure, much of the experimentation done has been carried on by specialists in the field, in the agricultural college, by business efficiency experts, and by special research workers in science and industry, but the situation is somewhat different in the matter of teaching procedures. Much of the experimenta-

tion that needs to be done in teaching must be carried on in elementary or secondary school classrooms, in a natural and normal teaching atmosphere, and by experienced and typical teachers.

In many instances the experimental pursuit of educational problems cannot be carried on in an isolated research laboratory. While it is probable that in many matters the inferences from the psychological laboratory experiment to classroom procedure may be safely drawn, it is difficult to say, for certain, just which modifications need to be made when the shift of learning-situation is made from the laboratory with university students to a high school class of thirty to forty boys and girls. The necessary modifications can only be guessed at. It is also certain that, so long as there is room for a reasonable doubt, there will be many who will feel that it is not wise to base classroom procedures upon the results of laboratory experiments. To just what extent university students learn differently, and just what effect is produced by such complicating factors as may be found in a typical schoolroom, no one can say. Disciplinary matters, the various degrees and shades of interest and attention, distracting thoughts excited by the presence of classmates, and the like, all may play important parts in influencing the learning process.

For example, experimental psychologists have found in the laboratory that the *whole method* excelled the *part method* for memorizing verbatim up to two or three hundred lines. Much of significance and certainty has been attached to these experiments, with very little checking-up in actual classroom situations. A number of other classic laboratory experiments might be cited which have tended to modify teaching procedures. Among these are experiments which relate to the best manner of distributing learning effort — daily, oftener, or less often; one or a few long periods, or

many short periods for study; the question of the transfer of training; visual *vs.* verbal presentation; and other debatable points in teaching procedure. These cannot be definitely settled in the psychological laboratory, nor in any one classroom. What may be true for one type of subject-matter, one age or type of student, or for any one of a large number of possible variable factors, may not be true, or at least to the same extent, for other types of these variable factors. It is because of these variables, and because of the enormous amount of experimental work that still needs to be done, that it is not wise that the research and experimental phases of our profession should be left entirely to the normal school teacher or the college or university professor.

Experimental work and promotion. In some of our public school systems, where superintendents or boards of education have taken an intelligent attitude toward the progress of education, and have shown a willingness to share in the responsibility for developing more effective teaching methods, teachers who evince an ability and a willingness to carry on experimental research have been favored by the assignment of lighter teaching loads. However, until the time comes when the value of such work is more clearly recognized by superintendents, principals, and boards of education, experimental work in education must be carried on largely alongside or in addition to the regular teaching schedules.

There is this encouraging fact, though, for the teacher who needs must take, for experimental work, the leisure hours spent by others in social life or other diversions, that the cards are stacked in favor of the experimental teacher. Without question, to teachers of equivalent merit in other respects, the most rapid and certain way to reach the places of high responsibility in the profession is through the prosecution and publication of some form of educational

research. While many very superior teachers "bloom to blush unseen" because their excellent service has less opportunity to come to the notice of the leaders in the profession, the teacher who investigates and publishes the results of careful investigation is almost certain to rise.

Need for experimental investigations. Educational organization, materials, and procedure have been for centuries the subjects of opinion, speculation, sophistry, and tradition. Education being a question of great social concern and interest, every one forms opinions as to educational matters. Almost every philosopher of previous times has left behind him observations upon some one or more phases of education. Some, like Plato and Rousseau, formulated an entire educational system on theory. These schemes and treatises contained much that was sound. They set forth many obvious truths and some excellent guesses.

But in a science where the raw material is so subtle, so intricate, so invisible, and so variable as is the human nervous system, and where its capacity and methods of learning are so variable, mere observation and deductive reasoning will not avail to sweep away the doubt which for long has enshrouded hundreds of questions and problems, upon the proper solution of which development of sound educational procedure must wait. To be sure, we have had answers to many of these problems, but answers which we now know did not rest upon known fact. One is reminded in this connection of a remark David Starr Jordan once made as to the stage of development of knowledge in the thirteenth century — that "there never was a period when we knew so much. The unfortunate fact, however, was that most of what was known was wrong."

Unsolved problems in education. The part of the field of education yet to be transformed from opinion and guess-

work, and from tradition and precedent to scientific facts, is astoundingly large, notwithstanding the rapid development made in experimental education during the past quarter century. One need but look about to discover questions in abundance still requiring solution — questions and problems of organization, administration, supervision, materials, and methods of teaching.

There is needed more scientific data on the relative efficacy of the junior high school organization of the various types; of departmental teaching; of the platoon system; on hundreds of problems connected with the selection, arrangements and emphasis of subject-matter in the curriculum; and on various financial, housing and hygienic phases of education. Especially is there need for experimental investigation of teaching methods, as, for example, the relative efficacy of different forms of instruction — visual instruction, the project method, socialized recitation, supervised study, the problem method, the Dalton plan — and the different types of each form. Still further, there should be ascertained what form of socialized recitation is most effective — the informal plan, the institutional plan, the self-directed plan, or variations of these plans, and for what types of subject-matter each form is best adapted. Experimentation should also be carried on to determine what elements of technique are most effective in each type of socialized recitation, and for different types of subject-matter.

These matters need to be determined not only in general, but also with respect to one another, and still further with respect to the age of the pupils, character of the group, size of class, and other variable factors. What may be best in one subject, or one part of a subject, or in one grade, or in a class of a certain size, or in combination with some other situations, or what may work well in one combination as to

the above varying factors, may or may not work equally well if some change is made in one or more of the factors. For example, what may work well with a small class, in one kind of subject-matter, and with some type of the project method, may not produce the same results with another small class in the same subject, when a different type of project method is employed.

An illustration of scientific fact finding. A good illustration of the importance of definite quantitative data on teaching method is found in the recent report, previously referred to, giving the results of an investigation of visual education. This was conducted by Dr. Frank M. Freeman, of the University of Chicago, and a group of associates. Before the publication of this work, many extravagant claims had been made, and widely accepted, as to the general superiority of visual material for school use, and especially motion-picture presentations. Very plausible explanations had been presented to account for this superiority. The researches carried on by Dr. Freeman and his associates furnished data showing that, in certain types of subject-matter, visual instruction is not superior or even as effective as verbal instruction; that film instruction is better than other forms of visual instruction only for teaching some kinds of things, but probably that the number is quite limited; and that, for other kinds of things, demonstration, charts, slides, or some combination of these, is superior to films. Data is also furnished bearing on the relative efficacy of different types of technique for employing visual material.

To obtain reliable data of this type it is necessary to conduct, as did Dr. Freeman and his associates, carefully controlled experiments, with means for the objective and reliable measurement of educational results. The solution of this problem called for a combination of laboratory and

classroom experimentation. As an illustrative example of the technique of carefully controlled classroom experimentation, we will now describe an actual experiment that was made under the direction of the author. Perhaps by so doing we can approach the description of the procedure in controlled classroom experiments best.

2. Technique of a controlled classroom experiment

The problem. During the past year the writer, desiring to obtain some light on the question of the relative efficacy of two plans of supervised study, conducted a controlled classroom experiment in an endeavor to obtain pertinent data. The two plans varied only in the portion of the hour during which the supervised study was conducted. It is the general practice, where supervised study is employed, to have the study preceded by the recitation and discussion of the previously assigned work. Many teachers have suggested that a better procedure would be to have the supervised study immediately precede the recitation, on the ground that the immanence of the recitation acts as a spur to better effort and concentration than where the study follows the recitation. It has been the experience of many teachers that difficulty is encountered, where the study period follows the recitation, in prevailing upon all students to study the appropriate subject during the supervised-study period. The students desire rather to spend their time in preparation for recitation in the study which comes in the next recitation period. Where supervised study must be supplemented by considerable home study, too, it is a question whether supervised study should be placed in the early part of the hour, or afterward. Students will tend to leave all preparation to this time, which, of course, would be inadequate. Even if preparation should be begun before coming to class, the idea is not wholly sound, as, after all, it

is the early stages of the preparation which most need supervision. It is in the early stage that the testing out of the assignment and the getting started correctly are done.

In the University of Oregon High School all class periods are fifty-seven minutes in length. This is true even in the junior division, comprising grades 7, 8, and 9. In these grades the students have no study periods, and a minimum of home study is expected for the average pupil. Hence for the average and brighter pupils, it is planned to allow for all study in the class period. This being true, the objections to the placement of the supervised study in the fore part of the period, mentioned above, lose weight. It was desired to know whether the reversal of the customary order of activity in the class period would increase the effectiveness of the work of the students. In an attempt to decide this question, it was decided to conduct a carefully controlled experiment in United States History in the seventh grade, during the second semester of the year.

Conditions of the experiment. It was desired to keep all factors as nearly constant as possible, except the experimental factor (E.F.) — namely, the order of supervised study and recitation.

The factors considered were:

1. Subject-matter, which was the same for both classes.
2. Time of day, which was the same for both classes.
3. Classroom — each class met in each of the two rooms for half of the semester.
4. Size of class — the two classes were of the same size — sixteen pupils each.
5. Teacher — two teachers of approximately equal ability and training were assigned to the two classes, and these teachers changed classes in the middle of the semester.
6. Methods of instruction — both classes were closely supervised by the head of the department, and as far as possible like methods were used.

7. Ability and intelligence of the pupils. For obvious reasons it would be impossible to try both methods with the same group of pupils. The task of selecting two groups of pupils of approximately the same ability involves some time and thought. Four criteria as to the ability of each individual in the two groups were employed:
- a. Mental age.
 - b. Intelligence quotient.
 - c. History grade of previous semester.
 - d. Score made on an objective history test.

What would constitute other variable factors which must be controlled would vary with the circumstances surrounding the experiment.

Technique of selecting groups of equal ability. Criteria *a* and *b*, of course, have to do with general intelligence, and *c* and *d* with ability in history. Not all investigators employ both mental age and intelligence quotient, but have used one or the other. As was pointed out in the preceding chapter, there are certain objections to the use of either alone. Mental age refers only to mental maturity, and in itself it is no index of brightness. A dull child may have a mental age greater than a bright child. If the difference in mental age is great enough, the former could be expected to do better school work; that is, the greater the mental age the more that can be expected in intellectual pursuits. Yet it is clear that of two children of the same mental age, the brighter should do better school work.

Unless the chronological ages of the given pupils are quite homogeneous, the classification of pupils on the basis of either mental age or brightness alone is not to be recommended, if accuracy is desired. If either is used in a given class or grade, where pupils are approximately of the same chronological age, as is true in a given school grade, the error from using either one but not both is not so great as where a group less homogeneous in age is being classified. In case

conditions permit the use of either alone, it makes no difference which one is used, as, for pupils of equal chronological age, I.Q. and M.A. are directly proportional. However, accuracy and precision demand some recognition of both factors. This was achieved by striking an average between the factors.

While general intelligence usually implies ability in any one school subject, correspondence is not complete. Quite frequently a student does much better or much poorer work in one subject than in another, and better or poorer than his general intelligence would indicate. Because this is true it seemed advisable, when dividing pupils into two equal groups, to take into consideration their achievement in history. For this purpose the semester marks of the previous semester for history were used. In addition, to make the matter still more objective, an objective history test was given all the pupils and the papers scored. The results of these two criteria were averaged in with the two intelligence ratings. The process of averaging could not be done directly. It would be impractical to average

Mental age.....	14.5
I.Q.....	104.
History mark.....	B.
History test score.....	43.

Even if the history mark were turned into a percentage, the result would still be unsatisfactory. The direct average would result in giving an emphasis to the I.Q. and the history mark out of proportion to the other two, and especially the mental age. While there is a process for treatment of scores of varying scales and ranges, it is a rather complicated procedure; and since it was apparent that little additional precision would be achieved as compared with a simpler method, the latter was used. The pupils were assigned rank on the four different items, and

the ranks were then averaged. Where two or more pupils had the same score, the average rank was assigned; that is, if four pupils were tied for third, fourth, fifth, and sixth places, each was assigned a rank of

$$\frac{3+4+5+6}{4}=4.5$$

After the ranks were averaged, the pupils' names were arranged in the reverse order of the magnitude of their average rank on the four items. The pupil of highest rank was assigned to division one, the second and third to division two, and the fourth to division one. In the second group of four the first was assigned to division two, the second and third to division one, and the fourth to division two. In this manner the two divisions were composed of pupils of approximately equal abilities. This plan of division has an advantage over that of assigning every other pupil to one division and the others to the other, in that where the latter procedure is followed the division receiving pupils 1, 3, 5, 7, etc., is certain to be somewhat stronger than the other, because their pupils are respectively stronger than pupils 2, 4, 6, 8, etc.

Measuring the results. After having selected the personnel of the two groups, and having outlined the teaching procedure to be followed in each, it was necessary to consider by what means the progress of the respective groups could be measured and compared. Such means should be, of course, objective and comparable for the two groups. It should take into consideration what achievement the pupils comprising the groups have made in the subject.

An objective examination consisting of twenty-four true-false items, thirty multiple-choice recognition items, a matching and an arrangement exercise of eight items each and twenty-eight completion and enumeration exercises —

ninety-eight items in all—was constructed to cover the work of the second semester. An attempt was made to emphasize in the test the things that would naturally be emphasized in the teaching of the groups during the two semesters. This test was given to both groups at once. The scores made on this test represent the amount of knowledge, skills, etc., in this particular section of history with which the pupils began the work of the second semester. The test was repeated at the end of the second semester. The pupils were not aware at any time that it would be repeated, and no copies of the test were allowed to fall into the hands of the pupils. No remedial teaching based on the test results and no further consideration of them was given until the tests were given a second time at the close of the semester. The tests contained so many items that there was practically no chance that any pupil would remember any specific item in the test. Had there been any danger of such memory carry-over, similar forms of equal difficulty could have been devised, half of the pupils in each group taking one form and the other half the other form at the beginning of the semester, and each pupil taking the form not already taken at the close of the semester. This construction of similar forms of a test is quite difficult to do successfully, and requires much time and effort. It is much easier to devise and administer one test of such a nature that the carry-over is negligible.

The net result of the instruction in the two groups may be measured by the difference between the scores on the first giving and the second giving of the tests. The results obtained are shown below, in tabulated form:

	AVERAGE SCORE ON FIRST GIVING	AVERAGE SCORE ON SECOND GIVING	NET GAIN
Group A (Sup. study first)	47.0	56.0	9.0
Group B (Sup. study last)	58.9	67.0	8.1

Conclusions from the experiment. In the teaching of United States History to seventh-grade pupils, where a class period of fifty-seven minutes is used and no home study required, so far as could be measured in an objective test emphasizing information, it makes but little difference whether supervised study precedes or follows the discussion in the class hour. An interesting outcome of the study was that data was furnished on many side issues that had not been specifically looked for. For example, it was interesting to note that data was furnished, among other things, on the following:

1. The relation there seemed to be between progress made by individuals and their intelligence, as measured by mental age, and as measured by the I.Q.
2. The relation there seemed to be between progress made and previous grades in history.
3. What one of the four criteria used in selecting the pupils for each group furnished the best basis for predicting achievement.
4. The relatively small amount of history learned during the semester as compared with the amount already known before.

Because light may often be shed incidentally on such related questions, all data in any experimental study should be carefully preserved, and the investigator should be on the alert throughout the study for such possibilities. It is not a bad idea to take notes on such points as they occur during the pursuit of a study, and to make note of questions for further and future investigations which occur from time to time lest these be forgotten.

This experiment has been described, in some detail, as a means of revealing to teachers something of the necessary technique of a controlled classroom experiment, and the care that must be taken in carrying it through to insure that only the proper factors are included and that the result

obtained is a real measure of what the experiment started out to determine.

3. Types of controlled experiments and their technique

The equivalent-group method. Because of the effect likely to be exerted on the operation of one E.F.¹ by the application of a previous E.F., and because also of the difficulty of discovering or devising a test or measuring instrument on which every unit represents equal progress and requires equal teaching skill to that of every other unit, most experiments of this sort should be performed with the use of one or more "check" or "control" groups. Because the check or control groups must be equivalent to the experimental group or groups in every significant respect except with regard to E.F. itself, this method is called the equivalent-group method.

The necessity of a control group may be readily demonstrated. Suppose it were desired to know what were the peculiar effects of the study of Latin on the development of vocabulary. If no control group is employed, the natural conclusion would be that all progress in vocabulary made during the period in which Latin was studied could be attributed to the study of Latin. But, clearly, this is not good logic. Other studies play a part in developing vocabulary. Ordinary home-life, reading in all connections, and playground and street conversation all contribute to vocabulary development. There should be credited to the study of Latin only so much development of vocabulary as is acquired in excess of what would have been acquired anyway through the channels of the other school subjects and

¹ E.F. = Experimental Factor — a method, condition, or any other thing which it is desired to test out or of which it is desired to measure the effects; e.g., the use of a project method, or a certain method of teaching foreign language.

out-of-school activities. There is no way to tell how much of the vocabulary development of a group of Latin students has resulted from the study of Latin alone. The most practical way to determine the amount of vocabulary development from their other sources seems to be by means of measuring the development of a check or control group, who are as nearly like the Latin group in every way likely to have any influence on vocabulary development, except that they are not studying Latin. In this experiment the study of Latin would be the E.F. Such possible points of necessary equivalence would be similar programs of study, equivalence in general intelligence, and equivalence of present development of vocabulary as tested by a standard vocabulary test. If sufficiently large groups are used, possibly such factors as out-of-school influences, amount of reading done, and the like may be assumed as a matter of chance to be equivalent.

It is probable that the equivalent-group method should be used whenever it is possible to obtain two groups, in every way equivalent as far as all significant factors are involved, except for the E.F. or the E.F.'s concerned; and where it is possible to keep equal or constant, for the two or more groups, the influence of any factors likely to influence the scores or measurements by which the effects of the E.F. are to be measured. Of course it is assumed with any method that some means of measuring the effects of the E.F. in objective quantitative units may be obtained.

Technique of the equivalent-group method. The technique of the equivalent-group method is fairly well illustrated by the controlled experiment described earlier in the chapter. Omitting technique common to all methods, the special technique of the equivalent-group method may be summarized as follows:

I. Select equivalent groups:

1. Determine what factors have influence in conditioning the results of the E.F., such as intelligence, or mental ability in a given subject, etc.
2. Devise some plan of equating the two or more groups with respect to these factors.
3. Measure as far as possible by means of objective tests, the pupils from which the two groups are to be selected as to such factors as general intelligence, special subject abilities, chronological age, reading ability, etc., and rank them on the basis of such measurements.
4. Divide the pupils into equivalent groups, on the basis of these measurements and what other pertinent data it may be advisable to include, so as to obtain as nearly as possible equivalent groups for the purposes of the experiment. (Note how this was done in the experiment described.)
5. In making up the personnel of the groups it is often well to attempt to work out an equal distribution of sexes and of disciplinary "problems," even though it must be done by juggling the order of selection slightly on other points.
6. The method of ranking is suggested as a means of avoiding undesirable weighting of some of the items used as criteria for allotting pupils to groups.
7. Should certain items taken into consideration in selecting the groups, e.g. the I.Q., seem of much more significance than others, it may be wise to weight such items by multiplying all pupils' rankings on some items by a coefficient of 2, 3, or 4, and dividing when averaging by a divisor increased by the sum of coefficients so employed, less the number of items so weighted.
8. After the groups are so divided, it is well as a check to visualize the groups, and to reflect upon whether the groups are equivalent for the purposes of the experiment, and whether all significant factors that ought to have entered into the selection of the groups have been considered.
9. If very large numbers of students are involved, say, several thousand or more, a chance division, if it is certain that no selective factor is operating, will prove fairly reliable.

II. Keep conditions constant.

1. Outline and maintain the conditions of the experiment in such a way as to hold constant, or to keep equivalent, all conditions likely to have any influence on the results of the experiment except the E.F.'s themselves.
2. Formulate procedure and conditions which will meet the above conditions, such as equally favorable time of day, rooms, length of period, equally enthusiastic and skillful teaching, and equally suitable equipment.
3. Be continually taking stock as to whether conditions of equally favorable opportunity are present. Note and strive to equalize distractions, absences, etc. Where one or more pupils have enjoyed unusual opportunities, or have suffered handicaps not matched by pupils of other groups, note must be taken and correction made in the net results, usually by throwing out the results of such pupils and an equal number of corresponding pupils in other groups.
4. Avoid unusual conditions, such as appeal to do well on the experiment, or exaggerated use of rivalry, which may make the conditions surrounding the experiment unnatural.

III. Outline and administer a plan of checking results:

1. Ordinarily two identical or similar¹ tests must be given all groups, one at the outset and one at the close of the application of each E.F.
2. The initial test may be dispensed with, and the results of the final test be regarded as the net gain in instances where it may be assumed that the pupils at the beginning possess a negligible amount of such knowledge, skills, etc., as are aimed to be taught or tested; or where the two groups may be safely assumed to possess an equal amount of the knowledges, skills, etc., to be taught and measured, where only a comparison between two or more E.F.'s is desired.
3. The tests selected should be such as to conform to the criteria of objectivity (see discussion of objectivity in

¹ "Similar" is used here in its technical sense, meaning tests of exactly the same difficulty and similar content, and the exercises of which correspond one by one to those of the test to which it is similar.

preceding chapters) and they should emphasize the important aims of the subject-matter taught during the experimental period. They also should not emphasize types of results to which one E.F. is likely to contribute more heavily than another, save as such types of results are naturally the most important educational products.

4. If two comparable and similar forms of the tests are employed, great care should be exercised to see that they are really similar and comparable forms; and especially that they are of equal difficulty.
5. If there is little likelihood of a memory carry-over, two similar forms of the tests should be used.
6. In case similar forms are used, it is better not to use one form for the initial test and one for the final test, reversing the order on the final test; but to use one form for every other pupil in each group on the initial test and the other form for the other pupils, and to give to each pupil on the final test the form other than the one taken at the initial test.

Experiments with one group. Often it happens that there is not available for the purposes of experiment more than one class or group. Under certain conditions experiments may be carried on without a second or control group. We now turn our attention to a consideration of the more important of these.

In the one-group method we test out two or more methods, plans, devices, or other experimental factors by employing each in turn with a single class or group of pupils. We attempt to measure the results of the use of each experimental factor and to judge the experimental factors by comparing the results of each with those of the other or others. For example, we may try one method to improve the rate of reading or the improvement of composition and measure the results, then try a second or third method of teaching these things and measure again, basing conclusions as to the relative effectiveness upon

comparison of the results. It is the method most commonly employed in ordinary life situations. We try one diet, note results; try another, note results; compare results. We try one plan in advertising, in handling our children or friends, and, if not satisfied, another and another, roughly measuring and comparing results.

For careful experimentation the one-group plan may be employed only, as previously suggested, when certain conditions obtain. The first of these is that we must be able to be reasonably certain that the employment of the first experimental factor does not influence the operation of the second. If the employment of one plan of supervised study will operate to diminish or increase the results obtained when a second is employed, we can hope to be able to determine the relative efficiency of each only when we are able to know just how much the results from the second plan are influenced by the use of the first, so that we may allow for such influence. This latter condition rarely exists. It should be obvious that the two experimental situations cannot be tried out over the same subject-matter, as one cannot be certain how much relative progress is made under each set of experimental conditions.

A second necessary condition for the safe use of the one-group method is that all factors (other than the experimental factors) which are likely to influence the results by which the effects of the experimental factors are measured must be equivalent or negligible in their influence. Among such possible factors are: period in the day, distractions, absences, demands on time of pupils from other subjects or sources, increased or decreased interest not due intrinsically to the difference in the two E.F.'s, or any other conditions which are not identical for the two experimental periods. For example, if one method is being tried during

the first semester and a second method during the second semester, one must make certain that all such conditions likely to affect the results of the experiment are identical, negligible, or equivalent for the two semesters.

In the third place, there must be reasonable assurance that the units of measurement by which the results of the experiments are measured are comparable. This statement will bear explanation and illustration. Suppose that with the application of one experimental factor an improvement in average percentage marks for a class in spelling of from 78 to 84 is noted, and during a later period of like length in which a second experimental factor is employed, that an average percentage of increase from 84 to 90 is noted. Can these improvements be regarded as equal and the conclusion that the two experimental factors are of equivalent value in the teaching of spelling be fairly arrived at? It is clear that the answer turns upon whether we know that an improvement of from 78 to 84 is exactly equivalent to an improvement of from 84 to 90. In all likelihood they are not equivalent. The higher we go up the scale the more difficult it becomes, ordinarily, to bring about a unit of improvement. Eventually a point is reached beyond which improvement is almost impossible. The necessity of making certain that the units of measurement along a scale of work or test scores are equivalent, so that improvement from 80 to 82 is equivalent to improvement from 90 to 92, is not generally appreciated. In passing, it should be noted, too, that for experimental purposes objective, reliable, and valid tests or means of measurements must be devised for recording and evaluating the relative effects of different experimental factors. Teachers' estimates or even grades made on tests of the essay type will hardly suffice.

Because these conditions are necessary to a safe use of

the one-group method and because so rarely do they all obtain or may be realized, the use of the one-group method for careful experimentation is extremely limited.

Technique of the one-group method. The technique of the one-group method is not complicated. It differs from the method used in the supervised study experiment which we have described earlier in the chapter only in the fact that one group is employed instead of two, and as a consequence there is no necessity for obtaining two groups of equal intelligence and ability, or of obtaining two groups of equal special ability in the trait being tested. The most important thing to bear in mind is the conditions under which the one-group method is valid, and to see that no circumstances arise which may influence the operation of either E.F. so as to obscure the effect of the other E.F.

It is necessary to devise some objective and an adequate means of measurement of the educational effects of the successive E.F.'s. Some test, or a measurement of some kind, must be given at the beginning of the application of each E.F. Usually, for classroom experimentation, a standard test or scale, or an objective written examination devised as previously described in the chapter describing the new types of examinations, is most useful. The same test or an equivalent form must be given at the close of the application of each E.F., and the gain for each E.F. is then calculated.

The rotation method. Sometimes in experiments it is not possible to equate factors likely to affect the results of the experiment or to achieve conditions necessary for one group experimentation. For example, it is not always possible to obtain equivalent groups. The schedule of classes may not permit of equivalent divisions. In some instances where this is the case, a resort to the rotation of classes may serve to equalize differences between the two

or more groups. For example, let us suppose an experiment continuing for a semester to determine the relative efficacy of three methods of teaching history — the A, the B, the C methods. Let us suppose that three classes of pupils are available, and that because of insuperable programming or other difficulties they cannot be redistributed into equivalent groups. The following rotation procedure might then be employed:

Each experimental method (E.F.) should be applied to one of the three groups for six weeks, after which the groups would be tested and the net gain recorded. Each division would now be assigned another method for another period of six weeks, after which a second testing would be made. For the remaining six weeks each method would be employed in that division in which the method had not yet been employed. A final testing would be necessary. Comparisons of the three methods could then be had by pooling the results of each method on the three classes and comparing the totals.

Not only may the groups be thus rotated, but any irrelevant factor may be rotated as well. In an experiment performed in the University of Oregon High School with two divisions of history, it was not possible to say for certain that the two teachers were equivalent. It was not desirable that it be left as a possibility that whatever difference was obtained between the two divisions might be ascribed to a superior teacher. At the close of the first nine weeks, the teachers and rooms were rotated, the divisions going on with the same methods. It might be set up as a principle that all irrelevant factors or conditions which might affect the results in favor of one or more E.F. must either be equated, allowed for, or rotated out. Ordinarily they cannot be satisfactorily "allowed for" in terms of quantitative units of measurement.

Cautions as to the use of the rotation method. Use of the rotation device must be made cautiously. In the first place, some factors cannot be rotated out. McCall lists the following as of this type:¹

1. Uncontrolled bias on the part of the teacher or experimenter for a particular E.F.
2. Bias on the part of the test for a particular E.F.
3. Deliberate malingering on the part of the pupils, unless this is uniform throughout the experiment.
4. A carry-over from one E.F. to another.
5. Any tendency for one group to learn how to improve more rapidly with the progress of the experiment than any other group.
6. Any tendency for one group to become more fatigued or bored with the progress of the experiment than any other group.

In addition to the limitations of the rotation method just given, its use is based upon the two following assumptions:

1. That the results due to variables other than the respective E.F.'s are negligible, equal for each E.F., or are equalized by rotation.
2. That the results obtained by any one E.F. are not affected by the use of any preceding E.F., or that the effects upon any E.F. are not conditioned by the operation of any other irrelevant factors — a very unlikely assumption, the truth of which can only be guessed at for any given investigation.

Comparison of the three procedures. Each method has its peculiar strong points and its peculiar limitations. These may be summarized briefly, as follows:

As pointed out the one-group method can be used only where no significant effect of one E.F. upon a later one may be safely assumed, and where the results from the various E.F.'s may be measured in comparable units. It must also be assumed that the attention and interest of the class is not

¹ From *How to Experiment in Education*, by William A. McCall. Reprinted by permission of The Macmillan Company, publishers.

different for one E.F. than for any other, except because of the inherent nature of the E.F. On the other hand, by using the one-group method the necessity for obtaining equivalent groups, sometimes impossible, or of rotation for equivalence, is avoided.

Of the equivalent-group method, just the opposite may be said. One E.F. has no opportunity to affect the operation of any other. The subject-matter may be identical for the two groups, and may be measured by the same test and in comparable (the same) units. Yet with the use of this method there is the big problem of obtaining groups which are equivalent in every way for the purpose of the experiment, and for whom all factors but those under investigation may be kept constant.

Where the plan of rotation involves the application of different E.F.'s to each of the groups of pupils, the rotation method is subject to the disturbing influence of one E.F. upon a subsequent one. The danger of the tests favoring one E.F. is not to be overlooked. It has the distinct merit of equating irrelevant factors by rotating them, which is probably a more reliable plan than the selection of equivalent groups.

While the type of method employed will differ according to the situation, considering the possible effect of one E.F. upon another, the possibility of obtaining equivalent groups, and like factors, the method of equivalent groups is probably the most to be preferred where it may be used. By far the larger number of classroom experiments have been of this type, though in a number of experiments rotation of some one or more irrelevant traits has been employed. In the experimental work on visual education by Dr. Freeman, previously referred to, the plan of equivalent or "parallel" grouping was employed throughout.

Essentials of technique. There are certain outstanding

essentials of all experimental procedure which should be emphasized, and which may here be summarized, as follows:

1. The experimental problem should be quite definitely formulated, and what the experiment is to test, discover, or show, made clear. What shall constitute the experimental factors must be definitely determined.
2. Extreme care should be taken to be sure that the proper method of experimentation is employed — whether the employment of two groups or rotation is necessary or not.
3. Related and suggestive literature on the subject should be examined. *The Readers' Guide to Literature* or the *International Index*, for a number of years back, should be looked through for articles related to the topic being investigated and to the experimental methods being considered. Make a card bibliography of all related literature, showing author, title, journal or publisher, date, volume, and pages (in case of articles), or number of pages (in case of books or monographs). On each card should be placed a sentence or two which will indicate the nature of the reference, and its bearing upon the problem or experiment.
4. Care should be taken to devise tests for initial and final testing which are objective, which are representative of the aims and purposes and the content of the work covered, and which do not favor any E.F.
5. A complete and thorough survey-analysis of the situation, for all factors at all likely or capable of influencing, directly or indirectly, the results by which the experimental factor is to be measured, must be made with care at the outset of the experiment. Provision also must be made either: to so make constant or equal, for all experimental purposes, the influence upon the results of the experiment of such factors as the time of day, size of class, ability of pupils, etc.; or to devise a means for measuring the influence of such factors which cannot be equalized or made constant, so that such influence may be deducted from the results of the experiment.
6. Careful watch must be kept throughout the experiment for variable factors likely to affect the results by which the experimental factor is to be measured, as absences of pupils, changes in the time schedule or length or number of class periods, library facilities, unequal interferences due to the

participation of pupils in athletics, student plays, publications, debate, etc. For example, if one pupil in the group A who, because of superior ability, is excessively absent or becomes absorbed in some competing interest to the detriment of his work in the experimental group, it is probably good policy to disregard the results of that pupil, and of the one most nearly approximating him in the other group. Unusual disciplinary difficulties, or personal relation between teacher and pupils likely to affect the result of the experiment, must also be watched for and studied.

7. Upon the conclusion of the experiment organize and interpret the data. Use tabular and graphical representation wherever such will assist in disclosing the essential and interesting facts and the conclusions of the experiment.
8. Search closely for all facts or occurrences which may operate to detract from the reliability of your conclusions. Evaluate these carefully, and look for compensating factors.
9. Survey the whole experiment again for interesting sidelights, opportunities to throw light on problems not essentially a part of your main problem, and for new problems which your experiment has brought to the surface.

After the investigation has been finished, it ought to be written up; and, if the results are at all significant, it ought to be published. There are many educational journals that will be glad to print a good article, summarizing an important experiment. Examine the published reports of other similar investigations for ideas on writing and organizing your report. After finishing the report it is a good plan to submit it to some other research worker, preferably to one who has published previously, for criticism, suggestions, and evaluation. If the opinion as to its importance is favorable, the article should be submitted for publication. A printed article in some educational journal will do much to furnish self-confidence and encouragement to undertake some other worth-while experiment. Few things that teachers can do contribute so much to awakening a deep professional interest as the mastery of the technique of

controlled classroom experimentation, and nothing will serve more effectively to keep the classroom teacher professionally alive and growing than a progressive and an experimental attitude toward questions of teaching method and technique.

QUESTIONS AND EXERCISES

1. Make a list of the reasons why the classroom teacher is in an especially favorable position to do experimental work in connection with problems of teaching method.
2. In what ways is it likely that doing experimental work and writing for publication may lead to professional success — directly or indirectly?
3. Make a list of the dangers and limitations likely to apply to the conduct of such investigations by classroom teachers.
4. Make a list of five problems in teaching methodology which in your judgment need experimental investigation.
5. Criticize the procedure employed in the experiment with the two forms of supervised study, as described in this chapter.
6. Which is the better criterion of ability to do school work, mental age or the intelligence quotient? Why?
7. Outline briefly an experiment in which the principle of rotation could be employed.
8. Outline briefly an experiment which could be performed by the one-group method.
9. Outline in detail, from beginning to end, a classroom experiment which might be carried on under normal teaching conditions.
10. Select one experiment described in one of the references given below, determine to which type it belongs, and check up the procedure employed against the suggestions given in this chapter.
11. Be able to describe the conditions under which the one-group and the equivalent-group methods may be employed, respectively, and to outline the procedure for each.

SELECTED REFERENCES

- Beauchamp, Wilbur L. *A Preliminary Experimental Study of Technique in Mastery of Subject Elementary Physical Science*. In *Studies on Secondary Education*. University of Chicago, Supplementary Educational Monographs, no. 24, January, 1923. Pp. 47-87.
- Buckingham, Bruce R. "The Public School Teacher as a Research Worker"; in *Journal of Educational Research*, vol. 11, pp. 235-43 (April, 1925.)

Freeman, Frank, and others. *Visual Education*. Chicago: The University of Chicago Press, 1924. 315 pp.

Especially Chapter I, Part I, and portions of Part II. Relation to technique of experimentation. An account of controlled experimental investigations with visual means of instruction.

Henmon, V. A. C. "Needed Research in the Field of Learning"; in *Journal of Educational Research*, vol. 11, pp. 313-21. (May, 1925.)

A survey of some important problems of learning which invite investigation.

McCall, Wm. A. *How to Experiment in Education*. New York: The Macmillan Co., 1923.

A complete and thorough description of the one group, equivalent groups and rotation experimental methods. Pp. 1-80 are especially helpful.

Monroe, Walter S., and Johnston, Nelle Bomar. *Reporting Educational Research*. Urbana, Illinois: The University of Illinois, Bureau of Educational Research Bulletin, no. 25, 1925. 64 pp.

An unusually practical and helpful manual of suggestions on how to prepare manuscript on educational matters for publication.

Skinner, Charles, and Rich, Stephen G. "Visual Aids in Geography — An Experiment"; in *Elementary School Journal*, vol. 25, pp. 700-05. (May, 1925.)

Describes a quantitative controlled experiment to throw light on efficacy of films and slides in teaching geography.

INDEX

- Ability, class variations in, 464.
See also Individual Differences.
- Ability, equal, technique of selecting groups of, 511.
- Absentee pupils, 127.
- Accuracy of image, 187.
- Achievement tests and scales, standard, 392-426. *See also* Measurement.
- Acquisition of habits and skills, 21-24, 174; relation to the laws of learning, 21; suggestions on technique of developing habits and skills, 22; ideals and attitudes, 24-28; information and skills *vs.* attitudes, 24; concomitant incidental outcomes, 24; attitudes, interests, and ideals through the curriculum, 26; technique of the appreciation lesson, 26; motor control, 174.
- Acquisition and imparting of information, 3-18; two main methods employed, 3; relative advantages of the developmental and authoritative methods, 4; telling methods, 5; peculiar advantages of telling, 7; opportunities for telling, 8; technique of telling, 9; reading as a form of telling, 11; the textbook, 11; textbook teaching, 12; suggestions on technique of textbook teaching, 13; collateral readings, 15; using collateral readings, 16; other methods of teaching information; developmental methods, 17.
- Adjustment of class instruction to individuals, 466; of recitation devices and assignments, 475.
- Administering standard tests, 412.
- Administrative uses, of standard tests, 399.
- Aids, visual, increased need for, 184; types of, 205; effectiveness of, 207.
- Aims, necessity of keeping in view, 71; in terms of child development rather than of subject-matter, 72; of special subjects, 73; daily lesson aims, 76-79; pupil, 78.
- Algebra, lesson plan in, 94.
- Alternate-period plan, the, 107.
- Analysis of written test results, 478.
- Analytical diagnosis, procedures of, 482.
- Answers, handling of, 43.
- Appreciation, teaching pupils to study for, 163-67.
- Appreciation lesson, technique of, 26.
- Appreciation and enjoyment, teaching pupils to study for, 163-67; technique of teaching study for appreciation, 163; supervising study for appreciation in the study period, 163; providing opportunity for expression, 166.
- Arbitrary methods, in selection of subject-matter, 295; in teaching, 297.
- Arithmetic, chart for diagnosis in multiplication and division, 479.
- Art, suggestions for field trips, 224; supervised study in departments of, 137.
- Assignment, adjustment, 475; length of, 116; planning, 82; time for making, 59, 118; problems, 307; flexible, 467; revised, 129.
- Assignment procedure, 48-61.
- Assignment and supervised study, 116-19; length of the assignment, 116; assignments for junior high school and for the double-period plan, 118; time for making assignments, 118,

- Association, importance in learning, 153; unit, 151.
- Attention, necessity in repetitions, 152; low level of, 248.
- Attitudes and ideals, acquiring, 24.
- Authoritative method, of acquiring and imparting information, 4.
- Batavia plan, the, 108.
- Best-answer exercise, the, 433.
- Blackboard, use in visual instruction, 234.
- Books, teaching how to use, 157-63; reading as a study activity, 157; teaching pupils to read, 157; learning to read with thoroughness, 158; taking notes on reading, 159; learning to read rapidly, 160; building habits of reference, 161; use of reference works, 162.
- Central tendency, measures of, 418.
- Challenges, 346.
- Chart, diagnosis for multiplication and division, 479; in visual instruction, 229.
- Checking conclusions, 317.
- Child development, aims in terms of, 72.
- Civics, projects in, 334.
- Class helps, 129.
- Class hour, problems in, 307.
- Class instruction, adjustment to individuals, 466.
- Class management in the supervised-study period, 119-34; preparatory steps, 119; distractions, 120; mistakes in management, 120; the right way, 121; equipment for the supervision of study, 122; preserving self-reliance, 124; Socratic questioning, 125; individual differences and supervised study, 127; the absentee and the transfer pupil, 127; studying other subjects, 128; revised assignments and class helps, 129; group study, 130; establishing favorable relations, 131; studying pupils, 133; desirable human qualities, 133.
- Class needs, diagnosis of, 476.
- Class period, place of supervised study in, 112-16.
- Class procedure, socialized, 241-94.
- Class teaching, arguments for, 493.
- Class variations in ability, 464.
- Classroom experimentation, controlled, technique of, 503-30.
- Coefficients of reliability, in objective examinations, 440.
- Collateral readings, 15; how to use to advantage, 16.
- Collections, in visual instruction, 232.
- Commercial geography, lesson plan in, 83.
- Commercial subjects, supervised study in, 136.
- Completion exercise, the, 430.
- Concentric plan, the, 489.
- Conclusions, checking and verifying, 317; formulation of, 318.
- Conference plan, the, 109.
- Conferences, 271.
- Contracts, 346.
- Controlled experiment, classroom, 503-30. *See also* Experiment.
- Controversy, in class, 279.
- Conversational method of teaching, 252.
- Course, planning the work of the, 69; laying out the work of, 74; organizing on the problem basis, 303; in problem-project plan, 347.
- Culmination and judgment of projects, 344.
- Curve, distribution, 379; theoretical probability, 380.
- Daily assignments, problems in, 307.
- Daily *vs.* longer assignments, 60.
- Dalton plan, the, 496.
- Debate, as a socialized procedure, 290.
- Deductive procedure, data in, 313; inferring in, 316.
- Demonstrations, in visual instruction, 231.
- Developing habits and skills, technique of, 22.
- Development, social and personal, *vs.* subject-matter, 255.

- Developmental method, of acquiring and imparting information, 4, 17.
- Deviation, standard, 419.
- Diagnosis, testing for purposes of, 359; analytical, 482; class and individual needs, 476.
- Diagnosis chart, for multiplication and division, 479.
- Diagnostic examinations, creation of, 477.
- Diagnostic testing, 402.
- Diagrams, in visual instruction, 229.
- Differences, individual, adjustment of instruction to, 457-98; the teacher's problem, 457-66; plans for dealing with, 466-97. *See also* Individual differences.
- Differentiated instruction, 488; adjustment of technique for, 491.
- Discipline, poor, and socialization, 284.
- Discussion, rambling and unwise, tendency toward, 278.
- Discussion method of teaching, 252.
- Dispersion, and range, measures of, 419.
- Distractions, home, 104; in supervised study periods, 120.
- Distribution, frequency, 416; of intelligence, 463; of learning capacity, 461; of marks, 377-89.
- Distribution curve, the, 379.
- Distribution system, pitfalls in use of, 381-84; suggestions on use of, 384; points of superiority, 386; variations of plan, 387.
- Divided-period plan, the, 111.
- Double-period plan, the, 110, 118.
- Dramatizations, in visual instruction, 231.
- Drill, necessity for, 338; for skill or habit formation, 174; a type of supervised study, 137.
- Economy, administrative, of standard tests, 411; in new types of tests, 439.
- English, flexible assignment in, 468; lesson plan in, 89; projects in, 334.
- English subjects, suggestions for field trips, 223.
- Enjoyment, teaching pupils to study for, 163-67.
- Enumeration exercise, the, 429.
- Equal ability, technique of selecting groups of, 511.
- Equipment, for supervision of study, 122; in visual instruction, 200.
- Equivalent-group method, the, 516.
- Essentials of effective assignment, 51.
- Examination questions, weighting of, 373.
- Examinations, diagnostic, 477; objections to new types, 442-47; objective, 440; oral *vs.* written, 364; quizzes and marking, 357-91; new ideas in, 427-56; suggestions for giving, 375; written, objections to, 366-70; defense of, 370-72.
- Excursions, in visual instruction, 221.
- Execution of projects, 343.
- Exercises, in the new written examinations, 429-42.
- Exhibits, in visual education, 235.
- Experiment, controlled classroom, 509-16; the problem, 509; conditions of the experiment, 510; technique of selecting groups of equal ability, 511; measuring the results, 513; conclusions from the experiment, 515; their technique, 516-29; equivalent-group method, 516; technique of the equivalent-group method, 517; experiments with one group, 520; technique of the one-group method, 523; rotation method, 523; cautions as to the use of the rotation method, 525; comparison of the three procedures, 525; essentials of technique, 526.
- Experimental investigations, 256; use of standard tests in, 405; need for, 506.
- Experimental results, 257.
- Experimental work, the classroom teacher and, 503-09; the teacher's responsibility and opportunity for experimentation, 503; experimental work and promotion, 505; need for experimental investigations, 506; unsolved problems in education,

- 506; illustration of scientific fact finding, 508.
- Expression, providing opportunity for, 166.
- Fact finding, scientific, illustration of, 508.
- Factors, in retention of information once acquired, 18.
- Failing marks, number of, 389.
- Field trips, in visual instruction, 221.
- Film slides, 218.
- Films, objections to use of, 195; selection of, 217; technique in using, 217; value of, 196-200.
- Flexible assignment, the, 467.
- Flexible plan, of class-period division, the, 112.
- Follow-up work, in visual instruction, 214.
- Foreign languages, suggestions for field trips, 224; differing marks for quantity and quality in French, 471.
- Formal plan, the, 251.
- Formal type of socialized procedure, operating, 266.
- Formula for scoring objective examinations, 451.
- Formulation of conclusions, 318.
- Frequency distribution, of test results, 416.
- Function of the teacher, real, 145, 164; in the problem-solving exercise, 319.
- Functions of questioning, 32.
- Generalization, in the inductive procedure, 314.
- Geography, projects in, 335.
- Geography, commercial, 83.
- Geometry, differing marks for quantity and quality, 471.
- Globes, in visual instruction, 228.
- Government, completion exercise in, 431.
- Grade, daily oral-recitation, 362; use of ratios in averaging, 372. *See also* Marks.
- Graphs, in visual instruction, 229.
- Group, informal, the, 251; in socialized procedure, 273-76.
- Group projects, 334.
- Group study, 130.
- Group teaching, arguments for, 493.
- Grouping, homogeneous, 482; advantages, 483; dangers and limitations, 484.
- Groups of equal ability, technique of selecting, 511; of subjects, 151.
- Habit formation, drills for, 174.
- Habits of reference, building, 161.
- Habits and skills, the acquisition of, 21.
- Handling of questions, 43.
- Helpfulness, spirit of, 265.
- High school, changes in character of student body, 460; projects in, 334; special limitations in, 340.
- History, lesson plan, 86; example in problem-solving teaching, 304; flexible assignment, 468; matching test, 434; projects, 334; simple statement or enumeration exercise, 429; socialized lesson, 289; suggestions for study, 172; suggestions for field trips, 223.
- Home study, inadequacy of, 103.
- Homogeneous grouping, 482; advantages, 483; dangers and limitations, 484.
- Ideals and attitudes, acquiring, 24.
- Image, accuracy of, 187; vividness of, 188.
- Imagery, the need for adequate, 180-86; imagery in learning, 180; problem of verbalism, 181; causes of verbalism in the schools, 182; increased need for visual aids, 184; visual instruction out of school, 185.
- Impressions, first, importance of, 152.
- Incentive, testing as, 358.
- Individual differences, the teacher's problem with regard to, 457-66; educational waste, 457; importance of the able pupil, 458; classroom situation, 459; changes in the

- character of the high school student body, 460; relative distributions of learning capacity, 461; new knowledge as to individual differences, 462; distribution of intelligence, 463; class variations in ability, 464; other types of variation, 465; plans employed for dealing with, 466-97; adjustment of class instruction to individuals, 466; flexible assignment, 467; basing marks on quantity as well as quality, 469; supervised study, 473; adjustment of recitation devices and assignments, 475; diagnosis of class and individual needs, 476; creation of diagnostic examinations, 477; analysis of written test results, 478; remedial instruction, 480; use of such procedures becoming more general, 481; other procedures of analytical diagnosis, 482; homogeneous or "speed" grouping, 482; advantages of homogeneous grouping, 483; dangers and limitations, 484; technique of sectioning, 486; summary of technique, 487; differentiated instruction, 488; comparative values of the two plans, 490; adjustment of technique for differentiated instruction, 491; individual instruction, 492; older plans, 493; merits and defects, 494; Dalton plan, 496; supervised study, 127.
- Individual instruction, 492.
- Individual needs, diagnosis of, 476.
- Individual projects, 334.
- Individuals, adjustment of class instruction to, 466.
- Inductive procedure, data in, 311; generalization in, 314.
- Inferring, in the deductive procedure, 316.
- Informal group, the, 251; in socialized procedure, 273-76.
- Information, acquisition and imparting of, 3.
- Information and skills *vs.* attitudes, 24.
- Initiative, inadequate opportunity for training in, 247; provision for, 264; and problem-project, 331.
- Instruction, differentiated, 488; individual, 492; remedial, 480; visual, 180-204; need for adequate imagery, 180-86; values, 186-91; dangers and limitations, 191-200; equipment, 200-02. *See also* Individual differences, and Teaching.
- Intellectual project or problem, the, 333.
- Intelligence, distribution of, 463.
- Intelligence tests, 394. *See also* Measurement.
- Intensity, law of, and problems and projects, 330.
- Interest, low level of, 248; in project teaching, 327.
- Interests, attitudes and ideals, 26.
- Interpretation, of test results, statistical, 416-20.
- Investigations, experimental, 256; use of standard tests, 405; need for, 506. *See also* Experimental work.
- Junior high schools, assignments for, 118.
- Laboratory teaching, supervised study and, 136-40.
- Languages, foreign, projects in, 335.
- Latin, true-false tests in, 432.
- Laws of learning, relation to acquisition of habits and skills, 21.
- Learning, imagery in, 180, 186; unit associations, 151.
- Learning activity, importance of supervising, 101.
- Learning capacity, relative distributions of, 461.
- Learning projects, 333.
- Lecture method, of imparting information, 5. *See also* Telling.
- Lesson aims, daily, 76; pupil, 78.
- Lesson-assignment procedures, 48-61; need for effective assignments, 48; causes for such defective procedures, 49; essentials of an effective assignment, 51; criteria

- of effective assignment procedure, 52; time for making assignments, 59; question of daily *versus* longer assignments, 60; planning for assignments, 60.
- Lesson plans, writing out, 82; forms and examples of, 83; using, 96; in various types of procedure, 97; socialized, 285-91.
- Letter system, of grading, 378.
- Levels of mastery, 21.
- Library-study-hall plan, the, 109.
- Life topics, 346.
- Literature, true-false exercise in, 432.
- Main ideas, retention of, 149.
- Management, mistakes in, 120; the right way, 121.
- Manual training, suggestions for field trips, 224.
- Maps, in visual instruction, 228.
- Marking, accurate, importance of, 361; lack of agreement on same papers, 366.
- Marking, quizzes and examinations, 357-91.
- Marks, based on quantity as well as quality, 469; distribution of, 377-89; weaknesses of the percentage system, 377; letter system, 378; distribution curve, or "Missouri" system of marking, 379; pitfalls in the use of the "distribution" system, 381; danger in flexibility, 382; suggestions on the use of the distribution system, 384; points of superiority of the distribution system, 386; variations of the plan, 387; number of failing marks, 389; standard tests as basis for, 404.
- Mastery, levels of, 21.
- Matching exercise, the, 434.
- Material and physical projects, 332.
- Materials, for visual presentation, selection of, 190, 205-09; use by pupils, 216.
- Mathematics, projects in, 335; suggestions for the study of, 173; suggestions for field trips, 224.
- Measurement, needs for and purposes of, 357; commonly employed means of, 362-77; daily oral-recitation grade, 362; written papers and notebooks, 363; oral *vs.* written examinations, 364; announced or unannounced quizzes, 365; importance attached to written examinations, 366; different markings of the same paper do not agree, 366; educational objectives often not emphasized, 368; other objections to written examinations, 369; defense of the written examination, 370; use of ratios in averaging grades, 372; weighting of examination questions, 373; suggestions for giving written examinations, 375; standard means of, 392.
- Measures of central tendency, 418; of range and dispersion, 419; of relationship, 420.
- Measuring results, in a controlled classroom experiment, 509.
- Memorizing, methods in, 148; verbatim, 147; use of devices, 154.
- Methods of study, information about, 168.
- Missouri system of marking, the, 379.
- Models, in visual instruction, 229.
- Monopolization, tendency toward, 277.
- Motivation, use of standard tests for, 403.
- Motor control, helping pupils to acquire, 174.
- Multiple-choice exercises, suggestions on framing of, 448.
- Multiple-response exercise, the, 433.
- Music, suggestions for field trips, 224.
- Non-educational activity, and projects, 337.
- Norms, usable, in standard tests, 412.
- Notebooks, and written papers, 363.
- Notes, on reading, the taking of, 159.
- Objective examinations, types of, 440; the technique of, 447-53;

- procedure in construction, 447;
- suggestions on the framing of true-false and multiple-choice exercises, 448; suggestions for giving objective tests, 450; scoring objective examinations, 451.
- Objective tests, need for, 427; new types of, 429; suggestions for giving, 450.
- Objectivity, of new types of examinations, 437; of standard tests, 410.
- Occasions for review, 62.
- Office, rotation in, 272.
- One-group method, the, 523.
- Oral examinations, 364.
- Oral-recitation grade, daily, 362.
- Organization, selecting a plan for socialized recitation, 266; courses on the problem basis, 303; subject-matter, and projects, 336.
- Outcomes of teaching, and their development, 1-30; problem of teaching method, 1; acquisition and imparting of information, 3; retention of information once imparted, 18; acquisition of habits and skills, 21; acquiring ideals and attitudes, 24; concomitant incidental, 24; questioning and, 33.
- Papers and notebooks, 363.
- Part method, in memorizing, 148.
- Percentage system, weakness of, 377.
- Physical and material projects, 332.
- Physics, lesson plan in, 92.
- Pictures, in visual instruction, 233.
- Planning, for assignments, 60; instruction, 69-100; work of the course, 69-76; desirability of planning, 69; necessity of keeping aims in view, 71; aims in terms of child development rather than in terms of subject-matter, 72; aim of the special subjects, 73; laying out the course, 74; daily, 76-98; daily lesson aims, 76; sample daily lesson aims, 77; pupil lesson aims, 78; characteristics of serviceable aims, 79; content and procedure, 80; planning the assignment, 82; writing out lesson plans, 82; forms and examples of lesson plans, 83; using the daily lesson plan, 96; lesson-planning in varying types of procedure, 97; types of supervised study, 106-12; pupil, 342.
- Preparation of pupils, for visual instruction, 211; of materials, 212.
- Probability curve, theoretical, 380.
- Problem review, the, 64.
- Problem-project, and teacher-pupil recitation, 331; and training for initiative and individuality, 331.
- Problem-project method, technique of the, 340-47; special limitations in the high school, 340; selection of projects, 341; pupil planning, 342; execution of projects, 343; culmination and judgment of projects, 344; problem-project and other socialized procedures, 345; problems, projects, "challenges," "life-topics," and "contracts," 346; problem, project, and course of study, 347; summary of the problem-project method, 347-49.
- Problem-setting vs. arbitrary methods, 295-303; arbitrary selection of subject-matter, 295; arbitrary methods in teaching, 297; new attitude, 293; problems as the starting-point of thinking, 300; values of problem teaching, 301; training pupils in problem-solving, 302.
- Problem solving, a type of supervised study, 137; summary of processes, 318.
- Problem teaching, 295-322; problem setting vs. arbitrary methods, 295-303; opportunities for, 303-08; organizing courses on the problem basis, 303; example in problem-solving teaching, 304; future development of the idea, 305; problems in daily assignments, 307; problems in the class hour, 307; technique in, 308-19; types of procedure in problem-

- solving, 308; differences and similarities of the two procedures, 309; getting and keeping the problem in mind, 311; data in inductive procedure, 311; data in deductive procedure, 313; generalization in the inductive procedure, 314; inferring in the deductive procedure, 316; checking and verifying conclusions, 317; formulation of conclusions, 318; summary of processes in problem-solving, 318; function of the teacher in the problem-solving exercise, 319.
- Problems, teaching pupils to solve, 176; and projects, 323, 326, 327.
- Procedures, analytical diagnosis, 482; in assignments, defective, 49; effective, 51, 52; construction of objective examination, 447; lesson assignment, 48; lesson-planning, 97; problem-solving, 308; defects of traditional recitation, 241; questioning and assignment, 31-68; review, 61, 285; testing, 357.
- Procedure, deductive, data in, 313; inferring in, 316.
- Procedure, inductive, data in, 311; generalization in, 314.
- Procedure, socialized, types of, 248-53; aims and values, 253-59; cautions, 276; problem-projects, 345.
- Procedure and content, in daily planning, 80.
- Prognostic tests, 394.
- Program study, 167.
- Progress plan, the, 489.
- Project method, dangers, limitations, and objections, 336-40; five types of objections, 336; projects and the organization of subject-matter, 336; projects and non-educational activity, 337; difficulty of discovering projects, 338; necessity for drill and other non-project types of teaching, 338; evaluation of dangers and objections, 339.
- Project psychology and values, 327-32; problems, projects, and interest, 327; problems, projects, and the law of intensity, 330; problems, projects, and the transfer of training, 330; problem-project and the teacher-pupil relations, 331; problem-project and training for initiative and individuality, 331.
- Project teaching, what it is, 323-26; problems and projects, 323; origin of the term in teaching, 324; definition of project teaching, 325; projects, problems, and common sense, 326.
- Projects: types and examples of, 332-36; physical and material projects, 332; learning projects, 333; intellectual project or problem, 333; group projects or individual projects, 334; projects in various high school subjects, 334-36; selection of, 341; execution of, 343; culmination and judgment of, 344.
- Projects and problems, 323, 326, 327.
- Projective apparatus, for use in visual instruction, 200; instruction by means of, 217-20; selection of films, 217; technique in using films, 217; slides and opaque projections, 218; increasing use of slides, 219.
- Promotion, and experimental work, 505.
- Pupil lesson aims, 78.
- Pupil planning, 342.
- Pupil-teacher attitudes, wrong, 246.
- Pupils, teacher's study of, 133.
- Pupils' questions, 44.
- Quantity, basing marks on, 469.
- Question, good, what constitutes a, 35.
- Questioning as a teaching procedure, 31-48; wide use of the method, 31; functions of questioning, 32; questioning and the outcomes of teaching, 33; nature of "good" questioning, 35; wording must be clear, 35; must be adapted to pupil, 35; should definitely describe task of pupil, 36; should con-

- form to instructor's purpose, 36; avoid wording and organization of textbook, 36; should involve thought and organization, 37; types of thought questions, 37; unity in questioning, 39; procedure in questioning, 40; handling of answers, 43; pupils' questions, 44; Socratic questioning, 47.
- Questioning, assignment, and review procedure, 31-68; questioning as a teaching procedure, 31; lesson-assignment procedure, 48; review procedure, 61.
- Questions, thought, 37; pupils', 44.
- Quizzes, announced or unannounced, 365; review, 66.
- Quizzes, examinations, and marking, 357-91; needs for and purposes of measurement, 357; commonly employed means of measurement, 362; distribution of marks, 377.
- Range, and dispersion, measures of, 419.
- Rapid reading, 160.
- Rating teaching, uses of standard tests, 401.
- Ratios, use in averaging grades, 372.
- Reading, as a form of telling, 11; as a study activity, 157; collateral, 15.
- Recall, early, necessity of, 153.
- Recitation, question of whether study should precede, 115; oral, daily grade in, 362.
- Recitation devices and assignments, adjustment of, 475.
- Recitation procedure, defects of traditional, 241-48; lack of coöperative effort, 243; such teaching procedures do not generate pupil responsibility, 244; perfunctory school work a natural result, 245; wrong pupil-teacher attitudes, 246; inadequate opportunity for training in initiative, originality, expression, and judgment, 247; low level of interest and attention, 248.
- Recitation and supervised study, sequence of, 115.
- Records, testing for purpose of obtaining, 360.
- Reference, habits of, 161.
- Reference works, the use of, 162.
- Relations, between pupil and teacher, 131; and problem-project, 331.
- Relationship, measures of, 420.
- Reliable tests, need for, 427.
- Reliability, of objective examinations, 436; of standard tests, 409.
- Relics, in visual instruction, 232.
- Remedial instruction, 480.
- Repetition, for retention of information, 20.
- Repetitions, necessity of attention in, 152; incorrect, importance of avoiding, 156.
- Representatives, student, 270.
- Repressive supervision, a danger in socialized procedure, 279.
- Responsibility, pupil, the generation of, 243, 263.
- Results, analysis of written test, 478; experimental, 257; statistical interpretation of standard tests, 416-20.
- Retention, factors operating in, 18; permanence in visual instruction, 189; facts and ideas, 147-57; verbatim memorizing, 147; whole and part methods in memorizing, 148; learning the gist of things, 149; learning unit associations, 151; importance of first impressions, 152; necessity of attention in repetitions, 152; necessity of early recall and use, 153; importance of association in learning, 153; use of various memory devices, 154; importance of avoiding incorrect repetitions, 156; factors operating in retention, 18; repetition for retention of information, 20; levels of mastery, 21.
- Review procedure, 61-66, 285; place of the review in teaching, 61; purposes of the review, 61; occasions for review, 62; technique of the review lesson, 63; problem review,

- 64; socialized review, 65; review quizzes, 66.
- Revised assignments, 129.
- Rotation in office, 272.
- Rotation method, the, 523.
- Sample daily lesson aims, 77.
- Scales and tests, standard, 392-426.
- School tests, types and nature of, 392-98; standard means of measurement, 392; types of school tests, 393; intelligence tests, 394; prognostic tests, 394; achievement tests, 395; types of achievement tests and scales, 396; construction of standard tests, 397.
- Science, general scale in, 433; projects in, 334; suggestions for field trips, 223.
- Scoring objective examinations, 451.
- Scoring standard tests, 413.
- Sectioning, to provide for individual differences, 482-84.
- Sectioning, technique of, 486.
- Selection of projects, criteria for, 341.
- Self-reliance, preservation of, 124.
- Serviceable aims, characteristics of, 79.
- Shop, supervised study in the, 137.
- Skills, helping pupils to acquire, 174; rules to assist pupils in acquiring, 175.
- Skills and habits, the acquisition of, 21.
- Skills, and information, *vs.* attitudes, 24.
- Slides, use in visual education, 200, 218.
- Social sciences, suggestions for field trips, 223.
- Socialization, the movement for, 248.
- Socialized procedure, 241-94; defects of traditional recitation procedure, 241; types of socialized procedure, 248; aims and values, 253; technique of, 262-94; essentials, 262; operating the formal type, 266; operating the informal type, 273; dangers and limitations, 276; ex-
amples of procedure, 285; aims and values, 253-59; aims of socialized procedure, 253; subject-matter *vs.* social and personal development, 255; experimental investigations, 256; experiment results, 257; dangers and limitations, 276-85; cautions as to procedure, 276; tendency toward monopolization, 277; tendency toward rambling and unwise discussion, 278; controversy in class, 279; repressive supervision, 279; inadequate selection and emphasis of subject-matter, 280; lack of thoroughness in subject-matter, 281; danger of discouraging the slow pupil, 281; "half-baked" socialization, 282; developing unsocial attitudes, 283; socialization and poor discipline, 284; essentials, 262-66; fundamental principles, 262; spirit of pupil responsibility, 263; spontaneity, naturalness, and provision for initiative, 264; social solidarity and the spirit of helpfulness, 265; and problem-project method, 345; examples, 285-91; review procedure, 285; socialized review devices, 286; other socialized lesson plans, 287; socialized history lesson, 289; debate as a socialized procedure, 290; other devices, 291; operating the formal type of, 266-76; selecting a plan of organization, 266; use as little machinery as possible, 267; keep nature of the work in view, 268; student representatives, 270; conferences, 271; rotation in office, 272; operating the informal type of, 273-76; informal group, 273; technique of the informal plan, 274; types of, 248-53; movement for socialization, 248; forms of socialized class procedure, 250; formal plan, 251; informal group, 251; analogy to the discussion method, 252.
- Socialized review, the, 65; devices, 286.

- Socratic questioning, 47, 125.
 Solving problems, 176.
 Special subjects, aim of, 73; supervising the study of, 171.
 Specimens, in visual instruction, 232.
 Speed grouping, 482; advantages, 483; dangers and limitations, 484.
 Standard achievement tests and scales, the use of, 392-426; types and nature of school tests, 392; uses and values for classroom teacher, 398; selection of tests and scales, 406; statistical interpretation of test results, 416; uses and values for the classroom teacher, 398-405; administrative uses, 399; supervisory purposes, 400; uses in rating teaching, 401; diagnostic testing, 402; using standard tests for motivation, 403; standard tests as a basis for marks, 404; experimental investigation, 405; selecting tests to use, 406; purposes for which tests are to be given, 406; validity of the tests, 408; reliability, 409; objectivity, 410; administrative economy, 411; question of usable norms, 412; administering standard tests, 412; scoring standard tests, 413; dangers and limitations, 414.
 Statement exercise, simple, 429.
 Statistical interpretation of test results, 416-20.
 Stereograph, in visual instruction, 226; technique in use of, 227.
 Student representatives, 270.
 Study, information about methods of, 168; appreciation, 163; history, 172; mathematics, 173; special subjects, 171; training in, 144-79; how to retain facts and ideas, 147; how to use books, 157; study for appreciation and enjoyment, 163; methods of study, 167.
 Study activity, reading as, 157.
 Study-coach plan, the, 108.
 Study-hall study, 106.
 Study period, supervising study for appreciation in the, 165.
 Study program, the, 167.
 Study supervision, the need for, 101-43; importance of supervising learning activity, 101; new type of high school pupil, 103; inadequacy of home study, 103; physical conditions and distractions, 104; improper home help, 105; study-hall study, 106; types of supervised study plans, 106; place of supervised study in the class period, 112; assignment and supervised study, 116; class management in the supervised study period, 119; laboratory teaching, 136. *See also* Supervised study.
 Subject-matter, arbitrary selection of, 295; danger of lack of thoroughness in subject-matter under socialized procedure, 281; inadequate selection and emphasis of, 280; organization and projects, 336; *vs.* social and personal development, 255.
 Supervised study, assignment, 116-19; class management, 119-34; in dealing with individual differences, 473; place in the class period, 112-16; flexible plan of class-period division, 112; abuse of the flexible plan, 114; recitation or supervised study first, 115; need for, 101-06.
 Supervised-study types of plans, 106-12; limitation of the term, 106; alternate-period plan, 107; unassigned-lesson plan, 107; Batavia and the study-coach plans, 107; conference plan, 109; library-study-hall plan, 109; double-period plan, 110; divided-period plan, 111.
 Supervised study and laboratory teaching, 136-40; supervised study in the laboratory, commercial and art rooms, and the shop, 136; supervised study here of two types; drill and problem-solving, 137; special suggestions on laboratory supervised study, 138; other types of class management, 134-36; supervised study not necessarily an alternative to other methods,

- 134; supervising the study of pupils without special supervised-study organization, 135.
- Supervised study period, class management in, 119-36.
- Supervising study for appreciation in the study period, 165; of special subjects, 171. *See also* Supervised study.
- Supervisory purposes of standard tests, 400.
- Supplementary aid, value of visual instruction as, 190.
- Teacher, the real function of the, 145, 164; problem-solving exercise, 319.
- Teacher, responsibility of, 503.
- Teacher-pupil recitation, and problem-project, 331.
- Teaching, the problem of method, 1; arbitrary methods in, 297; problem-solving, 298-308; project, 323-56; questioning as a procedure, 31; rated by standard tests, 401.
- Teaching how to solve problems, 176.
- Teaching how to study, 144-79; types of training, 146; retention of facts and ideas, 147-57; use of books, 157-63; appreciation and enjoyment, 163-67; study program, 167; methods of study, 168; supervision of special subject, 171; acquisition of skills, 174; habit formation, 174; solving problems, 176.
- Teaching problem, 295-322; project, 323-56; textbook, 12.
- Technique, appreciation lesson, 26; study for appreciation, 163; controlled classroom experimentation, 503-30; developing habits and skills, 22; differentiated instruction, 491; equivalent group method, 517; informal group plan, 274; lecture method of imparting information, 9; objective examination, 447-53; one-group method, 523; problem-solving, 308; problem-project method, 340-47; review lesson, 63; sectioning, 486; selecting groups of equal ability, 511; socialized procedure, 262-94; textbook teaching, 13; using visual aids, 192, 205-40; differences in, 215; in using films, 217; of excursions, 222; in use of stereograph, 227.
- Telling, peculiar advantages as method of imparting information, 7; opportunities for, 8; technique of, 9; reading as a form of, 11.
- Tendency, central, measures of, 418.
- Test results, statistical interpretation of, 416-20; frequency distribution, 416; measures of central tendency, 418; measures of range and dispersion, 419; measures of relationship, 420.
- Test results, analysis of, 478.
- Testing, needs for and purposes of, 357-62; ordinary classroom testing procedures, 357; testing as an incentive, 358; testing for purposes of diagnosis, 359; testing for the purpose of obtaining school records, 360; importance of accurate marking, 361; diagnostic, 402; ordinary classroom, procedures, 357.
- Tests, criteria of, 435; types of, 393, 396; construction of, 397; standard, dangers and limitations of, 414; the selection of, 406.
- Tests and scales, standard, the use of, 392-426; types, 392-98; values, 398-420. *See also* Measurement.
- Textbook, as a form of telling, 11.
- Theoretical probability curve, the, 380.
- Thinking, problems as the starting point of, 300.
- Thoroughness, importance in reading, 158.
- Thought questions, types of, 37.
- Time, economy in visual instruction, 189; making assignments, 59, 118.
- Training, in problem-solving, 302; the transfer of, 330.
- Training for study, 167-77; study program, 167; information about methods of study, 168; suggestions for special subjects, 171; helping

- pupils acquire skill and motor control, 174; suggestions as to drills for skill or habit formation, 174; teaching pupils to solve problems, 176. *See also* Teaching how to study.
- Transfer of training, and problems and projects, 330.
- Transfer pupils, 127.
- True-false exercise, the, 432; suggestions on framing, 448.
- Types and examples of projects, 332-36; socialized procedure, 248-53; training for study, 146.
- Unassigned-lesson plan, the, 107.
- Unit associations, learning, 151.
- Unity, in questioning, 39.
- Unsocial attitudes, 283.
- Usefulness of standard tests, 406.
- Validity of standard tests, 408.
- Variation, class, ability, 464; various types of, 465.
- Verbalism, the problem of, 181; causes of, 182.
- Verbatim memorizing, 147.
- Verifying conclusions, 317.
- Visual classroom aids, 226-36; stereograph, 226; technique of the use of the stereograph, 227; maps and globes, 228; charts, graphs, models, and diagrams, 229; demonstrations and dramatizations, 231; use of specimens, relics, and collections, 232; pictures, 233; use of the blackboard, 234; exhibits, 235.
- Visual instruction, values of, 186-90; as a means of stimulating adequate imagery, 186; advantages of visual instruction, 187; accuracy of image, 187; vividness of image, 188; economy of time, 189; permanence of retention, 189; value of visual material as a supplementary device or aid, 190; selection of materials for visual presentation, 190, 205-09; limitations and dangers, 191-200; indiscriminate use of visual materials, 191; faulty technique in using visual aids, 192; small amount of thinking required, 193; weakens language training, 194; objections to the use of films, 195; educational films now available, 196; films to parallel instruction, 197; expense for films, 198; educational films and the "movies," 199; films *vs.* slides, 200; equipment needed, projection equipment, 200; other equipment, 202; selection of material, 205; technique, 209-16; occasions for visual instruction, 209; preparation of the pupils, 211; preparation of materials, 212; follow-up work, 214; differences in technique for different types of material, 215; uses of visual material by pupils, 216; projective apparatus, 217; various classroom aids, 226; outside the classroom, 221-26; field trip, or excursion, 221; preparation for trips, 221; suggestions on technique of excursions, 222; places to visit, 223; vocational and manual subjects, 224.
- Visual material, the selection of, 205-09; types of visual aids, 205; factors to be considered in determining what aids to use, 206; experimental data as to relative effectiveness of visual aids, 207; need for further experimental evidence, 208.
- Vividness of image, 188.
- Vocational subjects, suggestions for field trips, 224.
- Weighting of examination questions, the, 373.
- Whole method, in memorizing, 148.
- Wisconsin plan, of basing marks on quantity as well as quality, 470.
- Written examinations, importance attached to, 366; new types, 427-35; need for objective and reliable tests, 427; new types of objective examinations, 429; simple statement, or enumeration exercise, 429; completion exercise, 430; true-false exercise, 432; multiple re-

- sponse exercise, 433; best-answer type of exercise, 433; matching exercise, 434; criteria, 435; increased reliability, 436; greater objectivity, 437; administrative economy; time saved in giving, 439; time saved in scoring, 439; comparative merit of types of objective examinations, 440; five objections commonly made, 442; they do not measure the important outcomes of teaching, 442; they require time and money to prepare, 444; they encourage dishonesty, 444; students object to the tests, 445; do not provide training in organization and expression, 446.
- Written papers and notebooks, 363.
- Written test, analysis of results, 478.



LB
875
.D57

131528

Douglass, H. R.

Modern methods in
high school teaching.

CARRIE RICH MEMORIAL LIBRARY
CAMPBELL COLLEGE
BUIES CREEK, N. C.

